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TWENTY-SIXTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

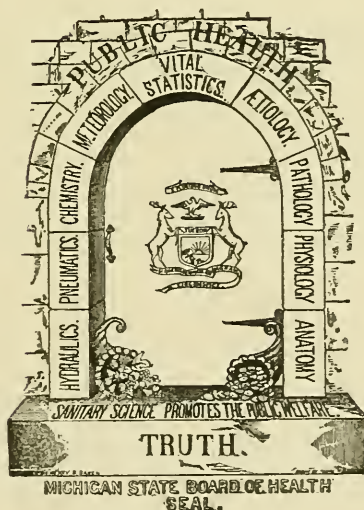
STATE BOARD OF HEALTH

OF THE

STATE OF MICHIGAN

FOR THE

FISCAL YEAR ENDING JUNE 30, 1898.



BY AUTHORITY.

LANSING

ROBERT SMITH PRINTING CO., STATE PRINTERS AND BINDERS

1900

RESOLUTION OF THE BOARD RELATIVE TO PAPERS PUBLISHED IN
ITS ANNUAL REPORT.

Resolved, That no papers shall be published in the annual report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who shall be entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein.

U. OF M. DUPL. EXCH. 12
Office of the Secretary of the State Board of Health, }
LANSING, MICHIGAN, *June, 1899.* }

TO HON. HAZEN S. PINGREE, *Governor of Michigan:*

SIR—In compliance with the laws of this State, I present to you the accompanying report for the fiscal year ending June 30, 1898.

Very respectfully,

HENRY B. BAKER,

Secretary of the State Board of Health.

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REPORT.

PART I.

This is the Twenty-Sixth Annual Report of the secretary of the Michigan State Board of Health, and is for the fiscal year ending June 30, 1898. It is arranged in two parts. The first part contains the secretary's report of the work of the Board, including the programs of sanitary conventions, reports of examination of plans and specifications of new State buildings, and minutes of regular and special meetings; a report of the work of the office, and brief statements relating to special subjects brought to the attention of the Board; then follows the secretary's annual report of property, including accessions to the library, with names of donors, and financial statements for the calendar and for the fiscal year. The second part contains papers, abstracts and reports, including one on the "Principal Meteorological Conditions in Michigan in 1897," one on "The Time of Greatest Prevalence of each Disease," being a Study of the Causes of Sickness in Michigan, especially in 1897, one on the "Communicable Diseases in Michigan in 1897"—relating to Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-Cough, Pneumonia, Consumption, Small-Pox, Chicken-Pox, R  theln, Mumps, Barber's Itch, Influenza, Cheese Poisoning, Puerperal Fever, Remittent Fever, Glanders, Hog Cholera, Tuberculosis in Cattle, Rabies, Lump-jaw, Mange, Meat suspected of being Diseased, Suspected Arsenical Poisoning, Poisoning by Pressed Beef and Sausage, Transportation of Dead Bodies, Practice of Medicine.

Some of these reports include the extensive and valuable statistics on the subjects of sickness, meteorological conditions, etc., collected at the office of the State Board of Health.

Under the law, the secretary of the Board is required to disseminate information "through an annual report and otherwise"; and, by direction of the Board, he issues immediately after the close of each week, a bulletin which shows the sickness during the week just passed; also a monthly bulletin; and sometimes publishes quarterly bulletins containing the proceedings of the Board and reports of the work of the office of the Board, and of the condition of health in Michigan during the quarter. The proceedings of sanitary conventions are published as soon as practicable after the occurrence of each convention. The office disseminates information by means of the telegraph, the telephone, by letter, and especially by means of hektographed statements prepared and dis-

tributed to members of the Board and others interested in public-health work, and to newspapers in Michigan. Thus items of sanitary interest in Michigan which are regarded as useful "news" are published at once in the comparatively ephemeral bulletins, etc., while the annual report is issued, not as a newspaper or journal is, as an ephemeral publication, but as a permanent official record of the work of the State Board of Health, and in the office of the Board, and of the local boards of health throughout the State. The annual report contains also statistics which require a great deal of painstaking care in their preparation, and which it is hoped will be useful, for all time to come, to those who study the causation of diseases; and through their labors, to the people of the State and country; and the statistics are there preserved in a permanent form, accessible, for purposes of study, to a comparatively large number of persons.

However, only about six thousand copies of the annual report are printed, to supply the two millions and more inhabitants of Michigan; and only 3,500 of those copies are at the disposal of the State Board of Health. Of these, some are sent to libraries, some are sent in exchange for the publications of other State Boards of Health, of prominent city boards of health, sanitary journals, authors of sanitary monographs, etc., others are sent to persons likely to make good use of them, including each of the fifteen hundred health officers of Michigan.

The names and postoffice addresses of the members of the Board, and the dates of the expiration of their terms of office, are as follows:

SAMUEL G. MILNER, M. D., Grand Rapids, Jan. 31, 1899.
 DELOS FALL, M. S., Albion, Jan. 31, 1901.
 HON. AARON V. MCALVAY, Manistee, Jan. 31, 1901.
 FREDERICK G. NOVY, Sc. D., M. D., Ann Arbor, Jan. 31, 1899.
 FRED R. BELKNAP, M. D., Niles, Jan. 31, 1903.
 HON. FRANK WELLS, *President of the Board*, Lansing, Jan. 31, 1903.
 HENRY B. BAKER, M. D., *Secretary of the Board*, Lansing.

The members of the State Board of Health, with the exception of the secretary, are appointed for the term of six years, and receive no salary or *per diem* compensation for their services.

STANDING COMMITTEES.*

1. Epidemic, endemic and communicable diseases—Fred R. Belknap, M. D.
2. Sewerage, and disposal of excreta—Prof. Frederick G. Novy, M. D.
3. Water supply, including purification of sewage—contaminated water—Prof. Delos Fall, M. S.
4. Buildings, including house drainage, ventilation, heating, etc.—Samuel G. Milner, M. D.
5. Climate, geology, topography, and drainage—Henry B. Baker, M. D.
6. Food, drinks and their adulterations—Prof. Delos Fall, M. S.
7. Poisons, explosives, etc.—Prof. Delos Fall, M. S.

*Committees as re-arranged and adopted by the Board, Sept. 29, 1893; members as appointed by President Wells, July, 12, 1895, and Jan. 7, 1898.

8. School hygiene and sanitation—Samuel G. Milner, M. D.
9. Sanitary inspections in cities and villages—Hon. A. V. McAlvay.
10. Statistics of mortality and sickness—Henry B. Baker, M. D.
11. Public-health legislation—Hon. A. V. McAlvay.
12. Finances of the Board—Hon. Frank Wells.
13. Animals' diseases dangerous to man—Prof. Frederick G. Novy, M. D.
14. Relations of preventable sickness to taxation—Fred R. Belknap, M. D.
15. Quarantine at the Michigan border and within the State—Hon. Frank Wells.

WORK OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1898.

Aside from the work in committees and in connection with the office of the secretary of the Board, the work of the State Board of Health itself includes that done by means of sanitary conventions, the examination of plans and specifications for proposed public buildings, under Sec. 7, Act 206, Laws of 1881, §418, Howell's Statutes, amended by Act 86, Laws of 1889, and Act 58, Laws of 1897, and work done at regular and special meetings.

SANITARY CONVENTIONS.

Two successful sanitary conventions were held during the fiscal year ending June 30, 1898.

DETROIT SANITARY CONVENTION, DECEMBER 9 AND 10, 1897.

At the sanitary convention at Detroit, the following program was carried out:

- Opening Address, by Charles Buncher, Detroit.
- Prayer by Rev. Nehemiah Boynton, Detroit.
- Statements of the Objects of the Convention, by Hon. Frank Wells, Lansing.
- President's Address, by Hon. Thomas W. Palmer, Detroit.
- Germs, What they are and How they Produce Disease, by Prof. F. G. Novy, M. D., Ann Arbor.
- Discussion of the subject, by Theo. A. McGraw, M. D., Prof. Fall, Doctor Baker, Prof. Novy.
- Isolation and Disinfection of Persons and Things, by Prof. Guy L. Kiefer, M. D., Detroit.
- Discussion of the subject, by Henry B. Baker, M. D., and others.
- The Needs for and Value of Public Health Work, by Leartus Connor, M. D., Detroit.
- Popular Education in Sanitary Science, by Prof. Harriet Marsh, Detroit.
- Discussion of the subject, by Prof. Whitney, Prof. Fall and others.
- Diphtheria and Scarlet Fever, their Restriction and Prevention:
 - From the Purely Scientific Standpoint, by Prof. Charles T. McClintock, M. D., Detroit.
 - From the Physician's Standpoint, by Prof. Charles G. Jennings, M. D., Detroit.
 - From the Standpoint of the Local Board of Health, by Oscar LeSeure, M. D., Detroit.
 - From the Standpoint of the State Board of Health, by Samuel G. Milner, M. D., Grand Rapids.
- General Discussion of the subject, by Doctor Baker, Doctor Duffield.

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Streets and Alleys and their Relation to the Public Health, by John McVicar, Detroit.

Discussion of the subject, by Mrs. L. H. Trowbridge, and others.

The Coming Golden Age (Poem), by Mary Stuart Coffin, Detroit.

Typhoid Fever and the Water Supply of Detroit, by Gardner S. Williams, C. E., Detroit.

Discussion of the subject, by Doctor Tibbals, Mr. Davock, and others.

Bicycling: From Social, Business and Healthful Standpoints, by Theo. R. MacClure, Lansing.

The Restriction and Prevention of Tuberculosis:

From the Scientific Standpoint, by Prof. Victor C. Vaughan, M. D., Ann Arbor.

From the Physician's Standpoint, by Charles W. Hitchcock, M. D., Detroit.

From the Standpoint of the Local Board of Health, by Samuel P. Duffield, M. D., Detroit.

The State's Interest, from the Standpoint of the State Board of Health, by Hon. Frank Wells, Lansing.

General Discussion of the subject, by Doctor Connor, and others.

Closing Remarks, by Hon. Aaron V. McAlvay, Manistee.

TAWAS CITY SANITARY CONVENTION, JANUARY 20 AND 21, 1898.

At the sanitary convention at Tawas City, the following program was carried out:

Address of Welcome. By Hon. Michael Murphy, Mayor of Tawas City.

Statement of the Object of the Convention. By Hon. Frank Wells, President of the State Board of Health, Lansing.

President's Address. By M. J. Conant, A. B., M. D., President of the Convention, Tawas City.

Municipal Sanitation. By Charles A. Jahraus, Tawas City.

Restriction and Prevention of Typhoid Fever. By Frederick C. Thompson, M. D., East Tawas, Michigan.

The Restriction and Prevention of Diphtheria. By M. J. Conant, M. D., Health Officer of Tawas City, Michigan.

More Complete Service by Health Officers. By George L. Cornville, Tawas City, Michigan.

Ventilation. By J. M. Walker, Tawas City, Michigan.

Healthy Homes. By Fred. R. Belknap, M. D., Member of State Board of Health, Niles, Michigan.

Pure Water. By Ansel H. Phinney, Ph. D., Tawas City.

Addresses given but not published.

Resolution, Closing of Convention.

EXAMINATION OF PLANS FOR STATE BUILDINGS,—SEWER-AGE, VENTILATION AND HEATING,— DURING THE FISCAL YEAR ENDING JUNE 30, 1898.

Act No. 206, Laws of 1881 (§418, Howell's Annotated Statutes), as amended by Act No. 86, Laws of 1889, and Act 58, Laws of 1897, is as follows:

Plans for building, to whom submitted.

"SEC. 7. That before the board of any charitable, penal, educational or reformatory institution shall determine on the plan of any building, or on any system of sewerage, ventilation or heating, which has been authorized by the legislature to be constructed, such plan shall be submitted to the Board of Corrections and Charities and the State Board of Health for examination and opinion thereon; and the board so submitting such plan shall, in its biennial report, show to what extent it was approved by the boards so examining them. And no money shall be paid out of the State treasury for the execution of any such plan or system until the Board of Corrections and

Charities shall file with the Auditor General a written opinion that the proposed plan is of such character that the construction may be fully completed in accordance therewith at an expense within the amount appropriated therefor. That it shall be the duty of said State boards to visit said penal, educational, charitable and reformatory institutions when necessary to make the examination herein required, and their expenses necessarily incurred shall be audited by the Board of State Auditors and paid from the general fund.

Approved March 31, 1897."

The following are reports concerning plans for public buildings, submitted to the State Board of Health for examination, during the fiscal year 1898:

EXAMINATION OF PLANS AND SPECIFICATIONS FOR A PROPOSED NEW
WORKSHOP FOR THE MICHIGAN SCHOOL FOR THE DEAF AT
FLINT, MICHIGAN.

(1830)

At a special meeting of the State Board of Health, held at Sand Beach, Michigan, July 31, 1897, the plans and specifications for a proposed new workshop for the Michigan School for the Deaf at Flint, Michigan, were examined in accordance with Act No. 206, Laws of 1881 (§418, Howell's Statutes), as amended by Act No. 86, Laws of 1889, and Act 58, Laws of 1897.

The specifications state that the Board of Trustees will furnish the heating, and the heating and ventilating registers, but do not describe the method of heating proposed; therefore no opinion can be formed, until the plan is submitted.

The present plans show the locations and sizes of the fresh-air and foul-air flues, and the positions of the registers, laterally, but do not indicate whether at the floor level. The foul-air registers should be at the floor level, and the architect says they are to be.

Each room is to be provided with separate fresh-air and foul-air flues, the latter being carried independently to the outer air above the roof, the discharge being through openings in the four sides of the brick smoke-and-ventilating stack. This arrangement of the foul-air flues is approved and commended.

Separate vent flues are to be provided for each of the toilet rooms and for the cloak room at the rear on the first floor, but the specifications state that these flues are to be connected to the main stack with galvanized iron ducts. The architect says they will there be connected to a flue separate from any other. Each flue should be carried independently to the outer air.

The doors connecting the several work rooms with the halls are to be provided with transoms, for what reason does not appear, unless for light and summer ventilation. If opened they would probably interfere with the ventilation. It is recommended that they be so made as to be kept closed in the cold weather.

The rain-water drains are to be placed *outside* the building and to be trapped with a six-inch trap, placed beyond the last branch or connection, and so constructed as to prevent back-watering. This is commended.

The soil pipe is planned to be carried to a point about four feet above the roof, and enlarged to six inches in diameter before passing through the roof. This is approved.

The traps and fixtures are to be vented with "back" and "local" vents, but the method of disposing of the "local" vents is not shown or described. *They should not be connected to the soil pipe at any point*, but be carried to a point above the roof.

Provision seems to have been made for *inlet* ventilation to the soil pipe. The trap which is shown in the four-inch pipe outside the building, is to have a shaft carried to the surface, and it should be left open at the top for ventilation, the opening being protected by a hood or grating. The trap and open shaft should be placed as far from the building as practicable to prevent foul air from the shaft entering the building by the reversal of the air-current during the discharge of a fixture.

The specifications properly state that the plumbing work is to be tested by the water and smoke tests at the proper times so that the work shall be left in a sound condition.

With the exceptions above mentioned, the plans and specifications were approved, so far as this Board is required by law to examine and express an opinion.

HENRY B. BAKER,
Secretary.

Office of the Secretary of the
MICHIGAN STATE BOARD OF HEALTH, }
Lansing, August 6, 1897.

EXAMINATION OF PLANS AND SPECIFICATIONS FOR A PROPOSED NEW
HOSPITAL FOR THE MICHIGAN SCHOOL FOR THE DEAF AT
FLINT, MICHIGAN.

(1831)

At a special meeting of the State Board of Health, held at Sand Beach, Michigan, July 31, 1897, the plans and specifications for a proposed new hospital for the Michigan School for the Deaf at Flint, Michigan, were examined in accordance with Act No. 206, Laws of 1881 (§418, Howell's Statutes), as amended by Act No. 86, Laws of 1889, and Act 58, Laws of 1897.

Except the showing on the plans of the fresh-air and foul-air flues, indicating that the heating is to be by the indirect method, there is nothing in the specifications relative to the proposed method of heating the building. Therefore no opinion can be formed until the plan is submitted.

The present plans show the locations and sizes of the fresh-air and foul-air flues, and the positions of the registers, laterally, but not whether at the floor level. The foul-air registers should be at the floor level, and the architect says they are to be.

The foul-air registers in two chambers on the second floor are planned to be under the windows, and to communicate with the vent flues on an inside wall by tubes laid between the joists. This is approved and commended, and this plan should be carried out in other rooms wherever practicable.

Separate vent flues, extending above the roof, are to be provided for the rooms located near to the brick smoke-and-ventilating stack, and also for each of the toilet rooms. This arrangement of the foul-air flues is approved and commended. The galvanized sheet-iron flues from the other rooms are planned to be carried independently to the attic, and be there connected to the main stack. This is not approved. Each flue should be carried independently to the outer air, but several flues may be grouped to avoid numerous openings through the roof.

Openings for the escape of foul air from the vent flues are shown on the north, south and west sides of the brick smoke-and-ventilating stack, above the roof. The smoke flue is on the east side.

The principal doors on the first floor are to be provided with transoms. If opened they would probably interfere with the ventilation, and might permit germs of disease to be wafted about the rooms of the building. It is recommended that they be so made as to be kept closed.

The positions of the medicine closets on the first and second floors are not good. They would not be easy of access at all times, and the air of these rooms would be likely to be fouled by the air of the toilet rooms. It would not be a good place to store such articles as absorbent cotton. It is recommended that the medicine closets be moved to some other parts of the building and that the space planned for a medicine closet be so transferred as to be between the ward and toilet room and be a vestibule, serving to separate the toilet room from the ward.

The rain-water drains are to be laid *outside* the building, and, with the exception of that which discharges into the cistern, are to discharge into an open ditch.

The subsoil drains and the drain from the overflow of the cistern are planned to join the four-inch crock drain through traps, which the architect stated would be so constructed as to prevent back-watering. This is commended.

No provision seems to have been made for the disconnection of the soil pipe from the sewer. There should be a self-cleansing trap, with an open shaft carried to or above the surface for inspection and *inlet* ventilation. This trap and shaft should be placed at a sufficient distance from the building to prevent foul air from the shaft entering the building by the reversal of the air-current during the discharge of a fixture.

The soil pipe is shown to be carried its full size to a distance of about four feet above the roof. This is approved.

The traps and fixtures are to be vented with "back" and "local" vents, but the method of disposing of the "local" vents is not shown or described. *They should not be connected to the soil pipe at any point*, but be carried to a point above the roof. The "back," or trap vents, should be connected to the soil pipe above the highest fixture.

It is recommended that the soil pipe and connections be tested with water before being covered or eased in, and by the smoke test upon completion of the work, all fixtures being in place and ready for use before the last test is made.

With the exceptions mentioned above, the plans and specifications were approved, so far as this Board is required by law to examine and express an opinion.

HENRY B. BAKER,
Secretary.

Office of the Secretary of the
MICHIGAN STATE BOARD OF HEALTH, }
Lansing, August 6, 1897.

Upon receipt of a copy of the foregoing report of examination of the plans and specifications for the proposed new hospital, the superintendent of the Michigan School for the Deaf wrote as follows:

MICHIGAN SCHOOL FOR THE DEAF, }
Flint, Mich., Aug. 11, 1897. }

DR. HENRY B. BAKER, *Secretary of the State Board of Health, Lansing, Mich.*

DEAR SIR—Your communications No. 1830 and 1831 were received on Sunday and laid before our Board at their meeting on yesterday. The Board directed me to return to your Board their thanks for the careful and thorough manner in which you have evidently examined the plans. In regard to No. 1830 I am directed to say that the heating of this building is to be put in by our own engineer and help. It will be indirect heating with foul-air registers at the level of the floor and the hot-air registers some five feet above the floor. The transoms over the doors are to be stationary and not intended to be opened at all. The "local" vents will be carried above the roof, as you suggest.

In regard to No. 1831 the same remarks apply to heating and ventilation, and to the transoms. The position of the medicine closets in this building have been the subject of a great deal of study, as it seems very hard to find any proper place for them. The trouble is that the amount asked for the erection of this building was cut in half, and instead of being what it should be it is at best only a makeshift. It is not intended as a hospital for regular use, but only for emergencies in case of contagious diseases, and the medicine closets were planned simply for the putting away of medicine in daily use, and not for the storage of things not in regular use, which are kept in the main building and will only be sent out there as needed. It was thought wiser to have these where they could be under lock and key, and not where patients in the wards could get at them. This is the reason why they were put beyond the bathroom. However, I will see the architect, and if it is possible will try and arrange some change in this matter.

The rain-water drains do not discharge into an open ditch, but into a six inch tile drain carried some four hundred feet to running water.

Respectfully,

F. D. CLARKE,
Superintendent.

PROPOSED NEW HOSPITAL BUILDING AT THE MICHIGAN ASYLUM FOR
THE INSANE AT KALAMAZOO, MICHIGAN.

The following letter and description of the proposed new hospital at the Kalamazoo Asylum will explain themselves:

MICHIGAN ASYLUM FOR THE INSANE, }
Kalamazoo, Mich., July 27, 1897. }

DR. HENRY B. BAKER, *Secretary State Board of Health, Lansing, Mich.*

DEAR DOCTOR:—With this I enclose you a brief description of the proposed new building for the Asylum. This building will be erected by the Asylum and not let by contract. We have our own foreman of construction, have employed a mason foreman, and will do the work most largely by day's labor although we may let a contract for the plastering, the slating and galvanized iron work. The heating,

ventilation and plumbing will be installed by our Asylum engineer, and every part will be put in in such a manner as to insure efficiency, perfect safety and to comply with all the requirements of sanitary engineering as we understand them.

The ventilation of the mop-room on the first floor is not shown. This room is ventilated by openings into galvanized iron pipes from the ceiling, which are shown on the second floor plan.

I regret that insufficient funds to employ architects to draft these plans, and other unforeseen delays, have prevented me from sending these plans to you sooner. I am, very truly yours,

W. A. STONE.

Assistant Medical Superintendent.

Hospital Building.

The purpose of this building is to provide room for forty female patients of the acute and presumably curable class. It will be made a hospital or sanitarium in every sense of the word and no effort within reach of the Asylum will be spared to promote the cure of those treated within it.

The act appropriating money requires that the building shall accommodate forty patients. The amount asked for by the trustees was reduced from twenty thousand dollars, a low estimate, to nineteen thousand dollars, which has made it necessary to economize, and even scrimp, in every possible thing. There has been no architect, but a draftsman has been employed to formulate the ideas, original and borrowed, of the superintendent of the Asylum.

The building consists of a basement, first and second story, and attic. The basement walls are of ordinary field stone, except inside walls and supporting pillars, which are of brick; all other outside walls are of brick. The main corridor walls inside are of brick, the cross-walls are of brick or of four-inch hollow building tile, as shown on the plan.

The basement is 8 ft. 6 in. in height and consists of the plenum corridor containing the pipe and radiators, boiler and coal room at the north end of the building, the kitchen and pantry and a Turkish bath to be installed at some future date. The boiler and coal rooms are dropped four feet below the level of the remainder of the building to provide for proper return and for water level. A cement floor will be laid in the basement at some future time when the funds of the Asylum will permit, this being one of the items stricken out of the appropriation. Steel I beams will support inside and partition walls, as shown. Each story is 11 ft. in height.

The first floor consists of the general corridor, a reception office and massage rooms, private water closet and lavatory, patients' water closet and bath rooms, parlor, dining room and pantry, alcoves for light or passage way, linen rooms, clothes closets, stairways, mop rooms, and thirteen rooms each 9x13 ft. 4 in., with clothes closet attached for patients. Also a seclusion ward containing three rooms, bath and closet, separated from the main part of the building by an isolation corridor.

The second floor is largely a duplicate of the first with dormitories in place of the dining and reception rooms and single rooms over the office and massage rooms. Bath rooms and closets the same as below, with the exception that the private water closet and lavatory appearing on the first floor are omitted.

The attic is intended to be finished off at some future time to afford rooms for extra patients or nurses, as shown by the plan.

Heating and Ventilating.

This building is to be heated by steam from a boiler placed in the north end and dropped four feet to obtain the proper water level and to allow for a return of condensation. The system is to be indirect gravity return.

Radiators of the Perfection Pin type, or other equally as good, are to be placed in the plenum at the places shown on the plans.

From each stack a heating flue, lined with fire clay chimney lining, with an inside dimension of 7x11¼ in., will lead to the appropriate termination in the rooms, as shown by numbers, and will open 8 feet above the floor and will be covered by proper wire screen.

The ventilators to each room will start at the floor level, will be lined with chimney lining of the same size above mentioned and will be carried to the attic and through the roof by means of galvanized iron piping either singly in part or in groups of three in other places and surmounted by a Star or Globe ventilator.

Plumbing.

All joints of lead pipe to be wiped.

All joints of wrought iron pipe to be screwed up in red lead.

All joints of cast iron pipe to be caulked with oakum, run with molten lead and caulked.

Connections between lead and wrought-iron pipe to be made with a brass soldering nipple, wiped to lead pipe and screwed into the wrought-iron pipe.

Connection between lead and wrought iron pipe and cast iron pipe to be made with a brass ferrule soldered to lead or screwed to wrought iron pipe and caulked with oakum and molten lead into iron hub.

Connection of fixtures with soil and waste pipes to be made with Y's.

Connection between iron sewer and vitrified pipes shall be made by a straight joint at a point 6 ft. outside the foundation walls.

All soil, waste and vent pipes to be extra heavy.

All water service pipes in building above basement floor line to be standard galvanized iron pipe and fittings.

All traps to be back vented with proper size pipes.

Soil pipe to be a riser of 4 in. run up for each series of fixtures and to extend through the roof and beginning at the last joint below the roof to be increased to six inches. An extra 2 in. riser of galvanized iron to be run up for the waste for each set of wash bowls.

Beginning with the trap of the lowest fixture, a vent pipe will be run to the attic, where it will be joined to the enlarged part of the soil pipe. All traps will be back vented into this.

The bath tubs will be of L. Wolf & Co.'s Corona, 5 ft. 6 in. long.

Supplies and over-flow to be of brass, nickel-plated, and supplies controlled with detachable keys.

The closets to be of L. Wolf & Co.'s white enameled diamond hopper.

In the special closet L. Wolf & Co.'s superior siphon jet closet D 268.

Slop sinks will be set up in connection with each set of bath room fixtures, and will be of Wolf & Co.'s B 883 and 18x22 in. enameled.

Wash bowls in each lavatory will be Wolf & Co.'s D 558, 18x25, white enameled lavatories with Boston self-closing faucets.

All traps will be either full S or half S traps, as will work in best, and properly ventilated to the iron pipe.

A catch basin will be provided on the line of the vitrified sewer near the building and a stone-ware elbow will be placed opposite the inlet, and turned down into the basin near the wall. This will prevent the grease and solid matter from passing into the sewer and will trap the catch basin from the sewer.

The catch basin will be covered with a four-inch stone and cast iron man-hole brought to the surface of the ground.

The building will be lighted by electricity and will also be properly piped for gas, which can be used in case of an emergency, failure of the electricity.

Inside Finish.

Floors will all be of oak except bath rooms, closets will be of tile. Doors will have a transom over each and will be made of Washington cedar. Base and window casings and trim will be of Southern pine or of white wood.

Examination of the plans and specifications for a proposed new Hospital building for the Michigan Asylum for the Insane at Kalamazoo, Michigan.

(1892)

At a special meeting of the State Board of Health, held at Sand Beach, Michigan, July 30, 1897, the plans and specifications for a proposed new hospital building for the Michigan Asylum for the Insane at Kalamazoo, Michigan, were examined in accordance with Act No. 206, Laws of 1881 (§418, Howell's Statutes), as amended by Act No 86, Laws of 1889, and Act 58, Laws of 1897.

In a letter dated July 27, W. A. Stone, Assistant Medical Superintendent, says: "This building will be erected by the Asylum and not let by contract. We have our own foreman of construction, have employed a mason foreman, and will do the work most largely by day's labor, although we may let a contract for the plastering, the slating and galvanized iron work. The heating, ventilation and plumbing will be installed by our Asylum engineer and every part will be put in in such a manner as to insure efficiency, perfect safety and to comply with all the requirements of sanitary engineering as we understand them."

The specifications state that the purpose of the building is to provide room for forty female patients of the acute and presumably curable class.

The building is to consist of a basement, first and second story, and attic, the basement to be 8 ft. 6 in., and the other stories 11 ft. in height.

The attic is intended to be finished off at some future time to afford rooms for extra patients or nurses.

The building is to be heated by steam from a boiler placed in the north end of the basement. The system is to be indirect gravity return.

Radiators of the Perfection Pin type, or other equally as good, are to be placed in the plenum at the foot of each warm-air shaft or flue.

From each radiator a heating flue lined with fire clay chimney lining, with an inside dimension of 7 by 11½ in. will lead to each of the rooms, and the warm-air flues will open into the rooms 8 ft. above the floors, the openings to be covered with wire screens.

The foul-air vents to each room will start at the floor level, will be lined with fire clay chimney lining of the same dimensions as the warm-air flues, and will be carried to the attic, and through the roof by means of galvanized iron tubes, either singly in part or in groups of three in other places, and each surmounted by a Star or Globe ventilator.

It is recommended that neither the entire basement nor the entire corridor be used as an air supply for the rooms above, especially as it is intended later to make use of the basement for cooking, bathing, etc. Each radiator should be inclosed in a galvanized iron box, or in a tight box, lined with sheet metal, and the air supplied to same through metallic tubes direct from some proper location outside of the building.

With this exception, the methods of heating and ventilating the rooms are approved.

The soil pipes are to be of 4-inch extra heavy pipe, with caulked lead joints; to extend 6 ft. outside the foundation wall; and to extend through the roof for outlet ventilation, the stacks being enlarged to 6 in. in diameter before passing through the roof. This is approved.

Separate 2-in. iron pipe stacks are to be provided for the wastes from the several sets of wash bowls. It is recommended that these stacks

be continued above the roof or be connected to the soil pipes at a point above the highest fixture.

From the traps of the lowest fixtures, vent pipes are to be run to the attic, where they will be joined to the enlarged part of the soil pipe, and the traps of all fixtures back vented into them. This is approved.

A catch-basin will be provided on the line of the vitrified sewer near the building and a stoneware elbow will be placed opposite the inlet and turned down into the basin near the wall. This is to prevent grease and solid matters from passing into the sewer and the elbow will trap the basin and soil and waste pipes from the sewer. The catch-basin should be placed as far from the building as practicable, and the cover should be perforated to allow for the admission of fresh air, which would pass up the soil pipes and carry away odors generated in the basin and at the same time secure the ventilation of the soil and waste pipes for which only partial provision has been made.

With the exceptions before-mentioned, the plans and specifications were approved, in so far as this Board is required by law to examine and express an opinion.

HENRY B. BAKER.
Secretary.

Office of the Secretary of the
MICHIGAN STATE BOARD OF HEALTH, }
Lansing, August 7, 1897.

PROPOSED NEW BUILDINGS AT THE HOME FOR THE FEEBLE MINDED, AT
LAPEER, MICHIGAN.

The following letter to Doctor Polglase was written by Secretary Baker of the State Board of Health:

STATE BOARD OF HEALTH.
MICHIGAN.

OFFICE OF THE SECRETARY.
Lansing, Aug. 24, 1897.

W. A. POLGLASE, M. D., *Medical Supt. Home for Feeble Minded, Lapeer, Mich.*

DEAR DOCTOR:—Upon my return home, I found the blue print plans for a proposed new laundry, and for a proposed new dining-hall building at the Home for the Feeble Minded at Lapeer. Your representative, Mr. Johnson, had left the plans with Mr. McClure of this office, after office hours, Saturday, August 21.

The law which provides for the examination of the plans for State buildings does not require this Board to make the plans, or any portion of them, but to examine and express an opinion thereon. As the proposed methods of heating and ventilation, and the plumbing and sewerage are not shown or described on the plans submitted, and no specifications are submitted, no opinion can be formed.

For your guidance in making plans for heating, ventilation and sewerage of the proposed buildings, I may state that this Board has approved of the "natural" method of ventilation, so designed as to supply at least 2,000 cubic feet of fresh air per hour for each individual, when the difference between the temperatures of the inside and outside air is not greater than five degrees,* the air to be warmed in cold weather by the "indirect" method of heating, before being delivered to the rooms. The fresh-air registers should be placed in the walls and not in the floors.

The foul air should be removed from *each* room by a *separate* flue, placed in or on

*How to secure this may be learned from two papers which I send you. [Reprints Nos. 385 and 459.]

an *inside* wall, and carried independently to the outer air. The foul-air registers should all be at the floor level, and whenever practicable, be placed in the walls under the windows, and by means of tubes laid between the joists, communicate with the foul-air flues placed on or in the inside walls.

The foul-air and fresh-air flues should be of the same size.

Relative to the sewerage of the buildings the principal requirements are as follows:

The main sewer should be of iron where it passes under any portion of the buildings and to a distance of at least five feet beyond the outside walls; the remainder of the sewer outside the building may be of glazed-stoneware pipes with socket joints, cemented.

A self-cleansing trap shall be placed in the main sewer beyond the last connection, and a shaft carried from this trap to the surface of the ground, the shaft being open at the top for *inlet* ventilation.

The soil and waste pipes inside the buildings should be of iron, with caulked lead joints, and be continued above the roof for *outlet* ventilation.

All fixtures should be properly trapped, and each trap protected against syphonage and back-pressure.

The whole of the plumbing and sewerage should be tested upon completion of the work, so that it may be left in a sound condition.

I enclose copies of some reports which have been made upon plans submitted to this Board in the past, and which will probably be of service to you in the preparation of plans and specifications for new buildings.

When the plans are finally submitted for examination, the purpose for which each room is to be used should be clearly stated.

The plans which you sent are here awaiting your instructions as to their disposal. There is really nothing in them requiring the calling of a special meeting of this Board to examine them. As soon as you have formulated plans for heating, lighting, ventilating, house drainage and sewerage, if you will send them to this office, it will give me pleasure to place the subject before the president of this Board, who will undoubtedly call a special meeting for the examination of the plans.

Very respectfully,

HENRY B. BAKER.
Secretary.

Later the plans were made ready for examination. The report of the examination is as follows:

Examination of plans and specifications for the proposed drainage, heating and ventilation of new buildings at the Michigan Home for Feeble Minded, at Lapeer, Michigan.

(1853)

At a special meeting of the State Board of Health, held at Detroit, on September 16, 1897, the plan for the proposed drainage of the new kitchen, dining hall, hospital and laundry buildings; the plans for the heating and ventilation of the new hospital building; and plans and specifications for the heating and ventilation of the new dining hall, were submitted to the Board and examined in accordance with Act No. 206, Laws of 1881, (§418, Howell's Statutes), as amended by Act 86, Laws of 1889.

Dr. Polglase, Superintendent, and Mr. Hevener, member of the Board of Trustees, were present to explain the plans.

Drainage of Kitchen, Dining Hall, Hospital and Laundry.

The plan shows the proposed positions of the main and branch sewers and manholes, also the size of the sewers, but the materials of which the sewers are to be constructed, the proposed system of ventilating, the

entire sewerage system, and the number, nature and location of all the plumbing fixtures and soil pipes are not shown.

Every portion of the sewers which passes under any part of the buildings should be of iron, with caulked lead joints, and the iron pipes should extend at least five feet outside the building. The balance of the sewers outside the buildings may be of glazed stoneware with socket joints, cemented.

All fixtures should be properly trapped, and the traps protected against syphonage and back-pressure.

Soil pipes should be continued, undiminished in bore, to a point above the roof for ventilation, but should *not* be trapped at the point where they join the sewers.

The inspection manholes shown on the plan should be provided with open gratings for the admission of fresh air to the sewers; the outlet ventilation will be secured by the continuation of the soil pipes above the roof, as previously suggested; but a better method than that shown on the plan submitted would be to dispense with one of the manholes entirely and place the other manhole, with open grating, in the main sewer, at its junction with the sewer from kitchen and dining room, and run a six-inch iron pipe from the highest point of the sewer to a point above the roof of the Laundry building. This manhole would suffice for all the buildings, and, by the suggested arrangement, the whole of the main sewer from the manhole to the Laundry building would then be ventilated, and would be well flushed by the large quantities of water from the Laundry building. By the plan submitted to this Board, the ventilation and flushing of the main sewer would be impeded by the manhole near to the Hospital building. If the manhole just referred to is not constructed the sewer from the Hospital building should be connected to the main sewer at a point lower down so that the flow of water from the Laundry building will not be obstructed.

The whole of the work, at completion, should be tested by the water or smoke tests, or both, so that it may be left in a sound condition.

Heating and ventilation of new Hospital building.

No specification or description of the proposed methods of heating and ventilation of this building accompanied the plans, but the location of the direct-indirect radiators in the several rooms, and the location of the foul-air registers, vertically, but not laterally, is shown on the plans. The foul-air registers should in every case be at the floor level. Members of the Board suggested that usually "direct-indirect" radiators do not, at all times, supply sufficient fresh air, because their heating surfaces are not always sufficient to do so in the coldest weather. The superintendent stated to the Board that these "direct-indirect" radiators were to be so constructed as to supply a sufficient amount of fresh air. Provision should be made for supplying fresh air at the rate of two thousand cubic feet per hour to each occupant.

The plan of the second floor shows that the foul-air shafts from six rooms are to be connected to one common flue in an outside wall. This is not approved. The foul-air flues from each room should be carried independently to the outer air, but, for convenience and architectural appearance, several of the flues may be grouped before passing through

the roof. No foul-air flue should go up in an outside wall, because of probability of down drafts.

No provision seems to have been made for the ventilation of the toilet room on the second floor, other than that which will be obtained by opening the windows. As this room is in close proximity to rooms which are evidently intended for occupation as sleeping rooms, *special* means of ventilation should be provided for the toilet room, entirely independent of the ventilation of any other room.

Heating and ventilation of the new Dining Hall.

The system proposed by the plans and specifications submitted, contemplates the heating of the building by means of direct-indirect radiators, placed under the windows in each room, and also in the stair hall of the first floor. A flue is to be placed in the wall immediately below each radiator, permitting the flow of outer air to the bottom of each radiator, the amount being governed by a proper apparatus connected with each flue, but the dimensions of these flues are not given. If the radiators will supply air sufficiently warm in the coldest weather at the rate of two thousand cubic feet per hour for each occupant the proposed method of heating this building will be considered satisfactory.

Flues are to be built in the inner and outer walls, with openings near the floor for carrying off the foul air from the different floors; all flues to be collected separately in attic to the central flue, which projects through and above the roof. The proposed method of discharging the foul air from all the rooms into one common shaft in the attic is not approved. Each foul-air flue should be on an inside wall and be carried independently to the outer air, but the flues may be grouped before passing through the roof, as suggested for the Hospital building.

Heating and ventilation of the new Laundry.

Nothing is shown on the plans relative to the heating and ventilation of this building, but superintendent Polglase stated that it was proposed to warm the building by means of the several steam-heated machines, and to ventilate both floors by means of a fan blower discharging to the outer air, and placed just below the ceiling of the first floor, the two floors being connected by an open stairway, fresh air to be supplied by open doors and windows. A mechanical blower is to be placed in one room on the first floor to be used as a drying room; air is to be drawn through this room from the main room on the first floor. The State Board of Health suggested that if this air be taken from the floor level this will serve to ventilate the first floor; and the fresh air should be supplied to the first floor through tubes which should receive the air from the outside at the floor level, and deliver the air near the ceiling, the stairway to be closed, fresh air to be supplied to the second floor by direct-indirect radiators and the foul air to be removed at the floor level through flues which shall go up to the outer air above, but not on an outside wall.

(Official.)

HENRY B. BAKER,
Secretary.

EXAMINATION OF THE PLANS AND SPECIFICATIONS FOR A PROPOSED
NEW COTTAGE FOR DISTURBED PATIENTS AT THE UPPER PEN-
INSULA HOSPITAL FOR INSANE, NEWBERRY, MICHIGAN.

At a special meeting of the State Board of Health, held at Lansing, Mich., May 13, 1898, the plans and specifications for a proposed new cottage for disturbed patients at the Upper Peninsula Hospital for Insane, Newberry, Mich., were examined in accordance with Act No. 206, Laws of 1881 (§418, Howell's Statutes), as amended by Act No. 86, Laws of 1889, and by Act No. 58, Laws of 1897.

Dr. Samuel Bell, Medical Superintendent, was present to explain the plans.

The proposed system of heating and ventilation contemplates the heating of the cottage both by direct and indirect radiation, the steam to be brought from the central heating plant. It is recommended that in every case preference be given to the "indirect" method of heating.

The indirect stacks are shown on the plans to be placed at the base of each hot-air flue or set of flues, and the specifications state that they are to be inclosed in galvanized boxings, "open at the bottom to the fresh air." It is recommended that the fresh-air supply be not taken from the basement corridors or rooms—the air of which may become contaminated in many ways, particularly by the sputa or infected shoes or clothing of those walking through them—but that it be taken from the outer air, and be conducted to the indirect stacks by metallic tubes.

It is proposed that each hot-air flue have a strip of tin for regulating the flow of air, the contractor to adjust these strips at completion so as to get the exact flow required. It is recommended that the area of the flues be left unobstructed, and the full size indicated by the plans.

The foul air is proposed to be removed from the rooms by flues carried down to the basement and there connected to a main shaft which extends from basement to roof; and several of these flues are shown on the plans to be connected together before they enter the main shaft. Each vent flue is to have radiation either directly in the flue or in a stack placed in the main vent shaft, "sufficient to give a continued forced draft to each flue;" but in warm weather, or at any time when the steam might be turned off, there would be no acceleration of the air in these flues, and the difference in friction in the flues, and the joining of some of the flues at right angles to each other would render the velocity in the flues unequal, consequently some rooms would not be well ventilated. The proposed method of carrying the foul-air flues downward to the basement and to one common duct is not approved. The foul-air flue from each room should be carried upward and independently to the outer air above the roof; but for architectural purposes, the flues might be grouped before passing through the roof. (The method of terminating the foul-air shafts at the roof, as shown on the plans for a proposed Infirmary at this institution submitted to this Board for examination in April, 1896, was recommended by this Board, and with the partitions between the several outlets recommended by this Board, this system is considered to be equally suited to the present proposed cottage.)

It is proposed to deliver the fresh air into the rooms at a point just

below the ceiling level, and to remove the foul air by registers placed at the floor level, and where practicable under or near the windows. This arrangement of the fresh and foul-air registers is approved and commended.

The plans and specifications relative to the arrangement of the plumbing and sewerage appear to be satisfactory, with the exception that the waste pipes from the bath and urinals and the vents from these waste pipes are not shown on the plans; but the specifications state that all wastes are to be properly ventilated into separate 2-in. cast iron vent pipes, to be carried up into attic and there connected to 4-in. cast iron pipe and extended to 2 feet above highest point of roof.

With the exceptions before-mentioned, the plans and specifications were approved, so far as this Board is required by law to examine and express an opinion.

HENRY B. BAKER,
Secretary.

Office of the Secretary of the
MICHIGAN STATE BOARD OF HEALTH, }
Lansing, May 16, 1898. }

In a letter dated May 17, Doctor Samuel Bell, Med. Supt. U. P. Hospital for Insane, Newberry, Michigan, wrote: "Your official report of the 14th inst. relative to the action of your Board concerning the plans and specifications for the cottage for disturbed patients, duly received and accepted by the Board of Trustees of the Upper Peninsula Hospital for the Insane at its regular monthly meeting today. Your valued suggestions in regard to ventilation will be carried out as far as possible."

EXAMINATION OF PLANS AND SPECIFICATIONS FOR A PROPOSED NEW
COTTAGE DORMITORY AT THE MICHIGAN HOME FOR FEEBLE
MINDED AND EPILEPTIC, AT LAPEER, MICHIGAN.

At a special meeting of the State Board of Health, held at Lansing, Mich., May 13, 1898, the plans and specifications for a proposed new cottage dormitory at the Michigan Home for Feeble Minded and Epileptic, at Lapeer, were examined in accordance with Act No. 206, Laws of 1881 (§418, Howell's Statutes), as amended by Act No. 86, Laws of 1889, and by Act No. 58, Laws of 1897.

No person was present to explain the plans and no statement was received as to the number of persons who are to occupy the dormitories; but it is believed that about seventy-five persons are to be accommodated.

The proposed system of heating and ventilation is not shown on the plans or described in the specifications, but the plans show the location of the fresh and foul-air flues in the walls and register openings to same, but do not show the proposed method of terminating the foul-air flues at the roof. In a letter from Dr. Polglase, dated May 6, it is stated that "The details of the heating system are not shown completely, as we will be unable to install it under the present appropriation. The flues and vents are shown for the fan system or they can be utilized as well for the indirect." Until a plan or plans and description of the proposed system

of heating and ventilation are submitted to this Board no opinion can be given. It is recommended, however, that the "natural" system of ventilation be adopted in preference to the "fan" system, and so designed as to supply at least 2,000 cubic feet of fresh air per hour for each occupant when the difference between the temperature of the inside and of the outside air is not greater than five degrees, the air to be warmed in the cold weather by the "indirect" method of heating, and delivered into the rooms through registers placed in the walls at a point eight feet from the floor level. The "fan" system of heating and ventilation is complicated especially where a system of temperature regulation is adopted; and it requires skilled help to operate and maintain the same in good working order, but the most important objection to this system is that there is no certainty that the fan will always be in motion, and when the fan is not in motion, the flow of air through the fan, heating coils and flues would be insufficient to maintain the air of the rooms in a sufficiently pure condition.

It is recommended also that the foul-air flues from each room be carried *independently* to the outer air, and that the register openings to the same be placed in the walls at the floor level—preferably under the windows—and communicate with the foul-air flues on the inside walls by means of tubes laid between the joists. For architectural purposes the foul-air flues may be grouped just before passing through the roof.

The plans and specifications show that the sewer which passes inside the building, and for a distance of six feet from any portion of the building, is to be of iron with caulked lead joints; and the main sewer and branch sewers from the rain conductors outside the building are to be of glazed stoneware with cemented joints. The vertical four-inch soil pipes, and two-inch vent pipes from the traps of fixtures are to be of iron with caulked lead joints, and to be continued above the roof for outlet ventilation. In these particulars the plans and specifications are approved and commended.

Partial provision is made for inlet ventilation to the sewer and soil pipes inside the building, by a four-inch iron pipe, extending from the house side of the trap which is shown to be just inside the foundation wall, to the outside of the verandah, but by the placing of traps on all the branch sewers from the soil pipes, the proper circulation of air through the sewer and soil pipes is rendered impossible.

The use of five traps in the sewer under the basement floor is considered unnecessary, and objectionable for the reason that they would prevent the free flow of sewage from the building and the circulation of air through the soil pipes, and would tend to frequent stoppages in the sewer.

The proposed position of the open end of the fresh-air inlet pipe is not good, for the reason that with a discharge from a fixture inside the building foul air would be driven out of this pipe at a point in the verandah wall near where the inmates might be sitting or standing.

For the purpose of overcoming the before-named objections it is recommended that the five traps in the sewer under the basement and the "back-water flap trap" in the main sewer be dispensed with, and that a manhole and self-cleansing trap be constructed at that point in the main sewer where it is proposed to place the "back-water flap trap," and that the top of the manhole be covered by an iron grating for the admission of air

to the sewer. This arrangement would insure a movement of air through every part of the sewer from the main trap to the top of the soil pipes, and no foul air would be discharged at the ground level in the immediate vicinity of the building by a reversal of the current of air in the sewer.

The proposed method of connecting the rain conductors direct to the sewer is not approved for the reason that foul air might be discharged from the conductors in the vicinity of the upper windows.

The proposed method of connecting the sub-soil drains direct with the sewer is not approved for the reason that foul air might escape through the open joints into the building, and in case of a stoppage sewage might leak through the open joints into and contaminate the subsoil, inside and outside the building.

It is recommended that the sewers from the rain conductors and the subsoil drains be conducted to a point near the suggested manhole and main trap, and connected to the sewer through a back-water valve and a trap with deep seal. This would insure the subsoil drains against flooding from stoppage in the main sewer, and preclude the passage of foul air from the sewer to the rain conductors.

The position of the water closet in the basement, as shown by the plans, is not approved. It is recommended that it be placed near an outside wall so that light and ventilation may be obtained to the same.

It is recommended that the outer doors of the cottage be made to open outward so as to afford rapid egress in case of fire.

With the exceptions above mentioned, the plans and specifications are approved, in so far as this Board is required by law to examine and express an opinion.

HENRY B. BAKER,
Secretary.

Office of the Secretary of the
MICHIGAN STATE BOARD OF HEALTH, }
Lansing, May 20, 1898.

REGULAR AND SPECIAL MEETINGS OF THE STATE BOARD OF HEALTH, DURING THE FISCAL YEAR ENDING JUNE 30, 1898.

REGULAR MEETING, LANSING, JULY 9, 1897.

The State Board of Health should have met in Lansing, July 9, at 10:30 A. M.; but, as Doctor Milner and Secretary Baker were the only members present, there was no quorum. On motion of Doctor Baker the meeting was adjourned to meet at Sand Beach, July 29, at 7:30 P. M.

SPECIAL MEETING, SAND BEACH, MICHIGAN, JULY 30-31, 1897.

The meeting was called to order by President Frank Wells. The other members present were Prof. Fall, Doctor Belknap, and Secretary Baker. The meeting was held at the cottage of Hon. Frank Wells, in accordance with call, for the examination of plans and specifications for a proposed new hospital building at the Michigan Asylum for the Insane at Kala-

mazoo, and for a proposed new hospital, and a proposed workshop at the Michigan School for the Deaf at Flint, and for the transaction of such other business as might properly be brought before the meeting.

The plans and specifications for the proposed new hospital at the Kalamazoo Asylum were carefully examined during the evening of July 30; and, with a few exceptions, concerning which recommendations were made, were approved. [The report of the examination of these plans and specifications will be found printed on the preceding pages of this annual report.]

On motion the Board adjourned until the next morning.

Second session, July 31, 1897.

The members present were—President Wells, Prof. Fall, Doctor Belknap and Secretary Baker.

The plans and specifications for the proposed new hospital and workshop at the Michigan School for the Deaf at Flint were then carefully examined; and, with certain exceptions, concerning which recommendations were made, the plans and specifications were approved. [The report of the examination of these plans and specifications will be found printed on preceding pages of this annual report.]

The secretary presented and read the minutes of the regular meeting of the Board, April 9, 1897. The minutes were approved as read.

The secretary presented and read the minutes of the special meeting of the Board held at Hanover, June 3 and 4, 1897. The minutes were approved as read.

The secretary presented and read the minutes of the regular meeting of the Board July 9, 1897. The minutes were approved as read.

State Board of Health vouchers numbers 2785 and 2787 and 2795 to 2812, inclusive, were allowed. State Board of Health school vouchers Nos. 1 and 2 were also allowed.

Doctor Belknap brought up the request of a local health officer, that the State Board of Health supply blanks for the use of householder's and physician's notice of a dangerous communicable disease. Secretary Baker pointed out the fact that the appropriation for the State Board was not sufficient to enable the Board to print so many blanks as would be required for that purpose; under such circumstances he claimed it was the duty of the various local boards of health to supply such blanks. He read Paragraph "II," page two, leaflet No. 120, issued by the State Board of Health, and said he thought that covered the subject.

President Wells congratulated the Board on the fact that at the recent session of the legislature, a small appropriation was made which enables the Board to fulfill the Act of 1895, relative to teaching in the schools how to restrict the most dangerous communicable diseases; he thanked the Board for meeting at this summer resort, one of the numerous ones in Michigan, which should be under the supervision of the State Board of Health; he suggested that the United States Life Saving Station at this place may be examined by the members of this Board, and mentioned in this connection the work of the Board relative to the resuscitation of the drowned. The plan recommended by the Michigan Board, necessitates the action of only one person, whereas other methods necessitate action by two. [Later, at this meeting, Secretary Baker presented a paper*]

*This paper and leaflet are printed on pages cvii-cxiii of the annual report for 1897.

on the subject of the treatment of the drowned, suffocated and electrically shocked, and on motion he was directed to have it published in the annual report, and the Board's leaflet* on the treatment of the drowned was slightly amended, a new edition ordered printed, and copies to be distributed to life saving stations, lake summer resorts, and other places around the State.]

Prof. Fall brought up the subject of the collection of samples of water from different parts of the State, to be tested for chlorine in order to map out the normal amount of chlorine in the natural waters about the State, to enable analysts to judge of the safety of samples of water hereafter examined, with a view to their use as water supplies.

He had corresponded with Prof. Davis of Alma College, who is working on the State Geological Survey, and had written to Secretary Baker, who had referred the letter to Prof. Fall. The letter offered to collect samples of water in the eastern part of the State. It is now agreed that he do so and send them to Prof. Fall for examination. Prof. Fall said he is now preparing to have samples of water sent by mail, more cheaply than heretofore by express.

On motion of Doctor Belknap, it was voted that the secretary thank Prof. Davis for his offer, accepting the offer, and ask that he send the waters, in accordance with his correspondence with Prof. Fall.

On motion, Prof. Fall was charged with the duty of presenting to the Quarter-Centennial Celebration the work of the Michigan State Board of Health in relation to the schools.

On motion, President Wells was charged with the duty of presenting to the same meeting the subject of Annual Conference Meetings of Michigan Health Officers.

On motion, Doctor Belknap was charged with the duty of presenting the subject of sanitary conventions.

On motion, Doctor Baker was charged with the duty of presenting "The Michigan State Board of Health—Historically, and its Achievements."

On motion Doctor Milner was charged with the duty of presenting the subject of the work of the Board relative to tuberculosis.

(Mr. MacClure had already undertaken the duty of making the history of the personnel of the Board from its organization.)

It was voted that the secretary be directed to extend to Prof. R. C. Kedzie, ex-president of this State Board of Health, a formal invitation to be present and take part in the Quarter-Centennial Celebration.

On motion it was voted that a similar invitation be extended to Hon. LeRoy Parker, ex-president of this Board. Similar motions were made and voted relative to Dr. J. H. Kellogg, and Dr. V. C. Vaughan, ex-members of the Michigan State Board of Health, and relative to Hon. John Avery, M. D., ex-president of this Board.

On motion of Prof. Fall, the president and secretary were appointed a committee to attend the meeting of the National Conference of State Boards of Health, at Nashville, Tenn., August 18, 1897.

The secretary presented a letter which Doctor G. H. Cattermole of the office had addressed to the members of the Board, asking for a leave of absence from September, 1897, to March, 1898. On motion the request was granted.

On motion, Dr. Cattermole was asked to study the subject of the best measures for the local health officers to take in connection with the State Laboratory of Hygiene, for the bacteriological diagnoses of the dangerous communicable diseases.

The subject of the alleged pollution of the St. Clair river was brought up by a letter from a health officer of a township situated on that river, who claimed that there is "large and increasing amounts of sewage in the waters of the river St. Clair produced by the discharge of the sewers of Port Huron and St. Clair cities into said river above this point." He suggests "That such oversight be used by the State Board of Health as would prevent an accumulation of sewage matter in all the rivers of this State to such an extent as shall be dangerous to the public health." Secretary Baker mentioned a paper read at the last meeting of the Michigan Society of Engineers by Engineer G. S. Williams, of the Detroit Water Board office, pointing out the facts relative to the unusual occurrence of typhoid fever in Detroit immediately following the dredging of sewage sludge from the bottom of Black river, Port Huron, and the emptying of that sludge into the St. Clair river. Secretary Baker read a communication from the secretary of the Massachusetts State Board of Health, in reply to his letter of inquiry, which says: "In regard to the general act in force in this State for the protection of the purity of inland waters, I can say without hesitation that the act as amended in 1888 is one of the most important and valuable laws ever enacted in this State. It has accomplished a great deal already for the purification of public water supplies and the adoption of efficient methods of sewage disposal in cities and towns, and has undoubtedly saved to the State a far greater amount financially than has ever been appropriated for the purposes of the act. Many towns and cities would, undoubtedly, have adopted unwise and expensive schemes had it not been for the enactment of this law." "The law was amended in 1888 as shown in the italicised line in the copy which I send you, and appears to be at present as perfect a law as can be asked for." The subject of sewage-filtration laws and the protection of the purity of the inland waters of the State was referred to the two committees of the Board, on "Water Supply" and "Sewerage," Prof. Fall to act as chairman.

On motion President Wells, Secretary Baker, Doctor Belknap and Prof. Fall were appointed a special committee to go to Detroit and make arrangements for a Sanitary Convention to be held in that city.

The secretary presented a letter dated July 26, which he had received from Doctor Milner. The letter expressed the hope that the Board would consider: (1) The subject of the isolation of tuberculous patients or inmates in asylums, prisons, hospitals, poorhouses, etc.; (2) the State or county to supply the newer remedies, and rules for the control of such tubercular persons; (3) rules should be made for the prevention of milk

infection—the milkman not to be allowed to leave his milk can where a contagious disease exists; and (4) an inspection of the sewerage, and provision for life saving at important health resorts.

On motion, Doctor Milner's letter was referred to Judge McAlvay, committee on legislation.

On motion the Board took a recess until 7:30 P. M.

Third session, 7:30 P. M.

The members present were: President Wells, Prof. Fall, Doctor Belknap and Secretary Baker.

The secretary presented the application of William E. Johnson of Detroit, for a position as clerk in the office. There being no vacancy, no action was taken.

The secretary presented the question of reprinting the leaflet [No. 237] on the Treatment of the Drowned.

On motion of Prof. Fall, one thousand copies of the leaflet [No. 237] were ordered printed and distributed to Life Saving Stations, Summer Resorts, etc.*

On motion, the Board ordered that Dr. Baker's paper on "Treatment of Drowned, etc." be printed in the annual report of the Board.†

The secretary presented his report of work done in the office during the second quarter of 1897. The report was accepted and placed on file. [It is printed on pages lxiv-lxxi of the annual report for 1897.]

The secretary presented a number of letters from secretaries of State Boards of Health, which he had received in reply to a circular from this office relative to securing the next meeting of the National Conference of State Boards of Health to be held in Detroit at the time of the Quarter-Centennial of this State Board of Health.

The secretary presented and read a circular letter dated July 19, which he had received from Dr. J. Berrien Lindsley, of Nashville, secretary of the local committee of arrangements for the meeting of the National Conference of State Boards of Health in Nashville in August, 1897.

Prof. Fall was requested to report, but asked further time to report on the advisability of printing in the annual report papers by Messrs. Williams and Hazen, the papers having been read and published by the Michigan Engineering Society.

The secretary presented a letter which he had received from Miles M. Dawson, consulting actuary New York City, relative to sickness-statistics of all diseases, for insurance.

The secretary presented letters from Doctor Belknap relative to the prosecution of a certain doctor in Niles for non-compliance with State law.

The secretary presented a stenographic report of the Conference of General Baggage Agents, Health Officials and Funeral Directors, at Cleveland, June 9, 1897. He also presented and read from the July number (1897) of the printed bulletin of the Ohio State Board of Health, relative to the proposed rules recommended for the transportation of dead bodies. The president and secretary were empowered to vote on this

*Printed on pages cxii-cxiii of the annual report for 1897.

†Printed on pages cxvii-cxiii of the annual report for 1897.

subject at the coming meeting of the National Conference of State Boards of Health.

The secretary presented and read, as a subject of interest, a postal card dated July 9, 1897, which he had received from William Squire, M. D., of London, England, ex-secretary of the Epidemiological Society, relative to antitoxin, and the method of the Michigan State Board of Health for the prevention of diphtheria, which Dr. Squire thought was more effective than antitoxin for the *prevention* of the disease.

The secretary presented and read Doctor Granger's letter of June 9, in which he informed the secretary that he had resigned as a member of the Board, and that his resignation had been accepted by Governor Pingree.

Prof. Fall reported the result of his work in the preparation of a pamphlet for the use of teachers in complying with the law which requires the teaching in the public schools of the modes of spreading and best measures for restricting the most important dangerous communicable diseases. Several hours were devoted to the examination of the work, and in the discussion of the subject. The secretary was directed to have hektograph copies made, and one sent to each member of the Board, for further study, with a view of perfecting it for publication.

On motion, a unanimous vote of thanks was tendered to Mr. Wells for the invitation and entertainment of the members of the Board during this special meeting, and for the courtesies extended to them during their stay in Sand Beach.

On motion, a vote of thanks was tendered to Capt. Wagstaff of the United States Government Boat, for courtesies to members of this Board while at Sand Beach.

On motion, a vote of thanks was tendered to Capt. Plough and crew, of the United States Life Saving Station, for their exhibition of the firing of the line, and the action of the breeches buoy.

The Board adjourned, about eleven o'clock P. M.

SPECIAL MEETING, DETROIT, SEPTEMBER 16, 1897.

Pursuant to a call by the president of the Board, the Michigan State Board of Health met in special meeting at the Cadillac Hotel, Detroit, September 16, at 7:30 p. m., to examine the plans and specifications for a proposed new kitchen and dining room at the Home for the Feeble Minded at Lapeer, Michigan, and for the transaction of such other business as might properly come before the Board at that time.

The meeting was called to order by President Frank Wells, and the other members present were as follows: Prof. Delos Fall, Dr. Fred R. Belknap and Doctor Henry B. Baker, secretary.

Mr. Hevener, member of the Board of Control for the Home for the Feeble Minded, and Dr. William A. Polglase, superintendent, were present to explain the plans and specifications.

Plans were submitted and examined for a laundry building, for a hospital building, for the extension of sewerage system, and for enlarging the present dining hall and kitchen.

On motion of Prof. Fall, the Board voted that the secretary draft a proposed report on the examination of the plans submitted, that the proposed report be submitted to the members of the Board for their ap-

proval; and, when approved by a majority of the members of the Board, the report should be sent to the Board of Control for the Home for the Feeble Minded.

[The report of the examination of the above mentioned plans will be found printed on preceding pages of this annual report.]

On motion the Board adjourned to meet again the next day at the call of the president.

Second session, Sept. 17, at 2:30 P. M.

The meeting was called to order by President Frank Wells. The other members present were: Prof. Delos Fall, Doctor Fred R. Belknap, and Doctor Henry B. Baker, secretary.

State Board of Health vouchers numbers 2816 to 2825 inclusive, except 2818, were allowed by the Board.

On motion, bills of members for expenses after breakfast, September 17, were allowed from the appropriation of the Board. (The expenses for railroad fares there and return and up to and including breakfast Sept. 17 to be paid on vouchers to be allowed by the Board of State Auditors.)

On motion of Prof. Fall, Judge Aaron V. McAlvay was appointed delegate to attend and represent the State Board of Health at the meeting of the American Public Health Association at Philadelphia, October 26-29, 1897. [Judge McAlvay was unable to attend that meeting.]

On motion the Board adjourned at 3:10 P. M. subject to the call of the president.

(No further meeting was held.)

REGULAR MEETING, LANSING, OCT. 8, 1897.

The State Board of Health met in regular meeting at the office of the secretary, October 8, 1897. The meeting was called to order at 10:30 by the president, Hon. Frank Wells of Lansing. The members present were: Hon. Frank Wells, Lansing; Doctor Milner of Grand Rapids, Judge McAlvay of Manistee, Doctor Novy of Ann Arbor, Doctor Belknap of Niles, and Secretary Baker, of Lansing. At eleven o'clock Prof. Fall came in and took his seat as a member of the Board.

The secretary read the minutes of the adjourned regular meeting that should have been held at Sand Beach, July 28; but because no quorum was present, the meeting was not held. The minutes were approved as read.

The minutes of the special meeting of the Board at Sand Beach, July 30-31, 1897, were read by the secretary, and approved as read.

The secretary read the minutes of the special meeting of the Board at Detroit, Sept. 16-17, 1897. They were approved as read.

On motion the Board voted that the vouchers of members for expenses in attending this meeting be allowed, subject to the certificate of the member, several members being unable to conclude in advance just what their expenses would be.

State Board of Health vouchers (ordinary fund) numbers 2813 and 2828 to 2843, inclusive, were allowed.

State Board of Health vouchers (school fund) numbers 4 to 9, inclusive, were allowed.

Secretary Baker presented his report of the conditions of health in Michigan, and of the work in the office during the third quarter of 1897. The report was accepted and placed on file.

On motion the Board took a recess from 12:35 to 1:30 P. M.

Afternoon session, at 1:45 P. M.

The same members were present as at roll call at the morning session. Prof. Fall came in and took his seat as a member of the Board.

Judge McAlvay mentioned that it would be impossible for him to act as delegate of the Board to the meeting of the American Public Health Association to be held in Philadelphia.

On motion the Board voted to direct the secretary to extend to all other living ex-members, not included in the former action of the Board, an invitation to be present at the proposed Quarter-Centennial Celebration.

President Wells complimented Governor Pingree on his good judgment in appointing Doctor Novy to the position of member of the State Board of Health.—“The appointment is not only a good one for the State Board of Health, but an excellent one for the State.”

The members of the Board unanimously agreed with President Wells' statement relative to Doctor Novy.

Doctor Novy said he appreciated the honor, and would endeavor to give the State good service during his term of office.

Prof. Fall reported that the Board had referred to him two papers—one by Allen Hazen and one by George S. Williams—to ascertain whether said papers should be published in the annual report. Prof. Fall reported that he had read carefully each paper and found each to be very interesting and valuable. He considered Mr. Williams' paper more practical for use in Michigan and for the information of municipal corporations, water-supply companies, and others. Prof. Fall thought that Mr. Williams' paper before the Detroit Convention might cover the same points.

Doctor Baker explained that Mr. Williams' paper for the Detroit Convention would be limited and would probably not cover all of the same points as in the paper above mentioned. The secretary also explained that the annual report of the Board would be bulky, and especially so if the Board of Auditors failed to permit the publication of the proceedings of sanitary conventions in supplement form. He thought Mr. Williams should be asked to write a paper for some future sanitary convention that would be a general paper on water supplies.

Doctor Baker's suggestion seemed to be the view of the members present; it was recommended by Prof. Fall.

Prof. Fall's report was accepted and placed on file.

Doctor Milner presented the following preambles and resolutions:

Whereas, In view of the eminent superiority of Michigan in natural advantages as a general resort for the people of other states during the summer months, it is of the utmost importance that the conditions of each individual resort shall be such as shall contribute to the highest pleasure and health of its guests;

Whereas, In the past summer at several pleasure and bathing resorts, and boat

docks in this State, a number of persons have lost their lives, and others have been endangered from inadequate protection and safeguards;

Resolved, That the Board at this meeting refer this matter to a proper committee for special consideration, who shall report its conclusions thereon; said investigation to include:

1. The drainage, sewerage, and water closets of hotels and cottages of such resorts.

2. The water supply for drinking and culinary purposes and for fire protection at such places.

3. The condition of buildings as to safe construction, and supply of appliances for protection of guests in case of fire and other calamities.

4. The care of milk, butter and meat.

5. The location of bathing places, and their supply of appliances for safety of bathers, such as danger stakes, life lines, life preservers, railings, boats and watchmen.

6. The protection of walks or bridges near water, declivities, and railways.

7. The organization and inspection of such places: (a) Whether by local health officers, (b) whether by special officer appointed and subject to this Board, (c) or whether to place the officers of such organizations or owners of such resorts under bonds to maintain a condition of safety to frequenters of such places.

After considerable discussion of the subject, the Board voted to refer the resolutions to the committee on legislation (Judge McAlvay) with request to report at the next meeting of the Board not only on these preambles and resolutions, but also on Doctor Milner's letter that was referred to the committee on legislation, at the Sand Beach meeting.

Doctor Belknap offered the following preamble and resolution:—

Whereas, The interests of the State of Michigan as a health resort, will in our opinion be best subserved by a more careful oversight of the health and safety of the resorters,

Resolved, That a committee be appointed by this Board to formulate some plan of action by which this Board may act in harmony with the managers of such resorts.

Doctor Belknap's preamble and resolution were referred to the committee on legislation.

Doctor Milner requested that, in writing up the press notice of the proceedings of this meeting, the importance of boiling water to be used for drinking be placed before the people.

In this connection the secretary mentioned the fact that the last monthly bulletin of "Health in Michigan" shows that whereas in the average September in the past eleven years typhoid fever has been reported by twenty per cent of the physicians reporting to the State Board, during September, 1897, only ten per cent of them reported typhoid fever, and that counting together typhoid and typho-malarial fever, only one-third as large a proportion reported such sickness in September, 1897, as in the average September. He thought this evidence very valuable, as showing that the surface drouth, which was severe throughout the State, has not caused an unusual amount of typhoid fever, probably because many of the people have taken measures to guard against it, and because the heavy rains earlier in the year have prevented the very great lowering of the water in wells. But the great lowering is now likely soon to occur, therefore, and because October is usually the month in which typhoid fever is most prevalent, it would be well to boil the drinking water and take such other precautions as are practicable.

The subject of the restriction of measles in Michigan was presented by Doctor Milner, and discussed at length by the Board. Doctor Milner

mentioned especially the recent action of the Board of Health of Grand Rapids in deciding not to enforce any restrictive measures.

Judge McAlvay mentioned some personal experience he had had. He thought that local municipalities would be liable for damages which should occur because of neglect to comply with law. On suggestion of Doctor Milner, Judge McAlvay was requested to prepare resolutions which the Board could adopt and spread about the State. The resolutions are as follows, and were unanimously adopted by the Board:—

Whereas, Section 1673 Howell's Statutes provides that, "When the small-pox, or any other disease dangerous to the public health, is found to exist in any township, the Board of Health shall use all possible care to prevent the spreading of the infection, and to give public notice of infected places to travelers, by such means as in their judgment shall be most effectual for the common safety," and

Whereas, It has come to the knowledge of this Board that in some instances local health boards and officers are neglecting to enforce said law with reference to some of said diseases,

Resolved, That the interests of the public health demand that said law should be enforced and all possible care be taken to prevent the spreading of dangerous communicable diseases; and we are of the opinion that neglect so to do not only makes such officers and boards liable under the law, but also subjects the municipalities they represent to liability for damages in case of death or injury arising from neglect to comply with the provisions of the statute.

The secretary read from his quarterly report parts relative to the distribution of publications and relative to the work and the clerks of the office. In this connection he presented the application and recommendations of William F. Davis for a position in the office. He also announced that Mr. George Saxton of Lansing was strongly recommended by Hon. Seymour Foster, and that Mr. William Johnston of Detroit had applied for a clerkship in the office.

The secretary read the names of those persons recommending Mr. Davis.

There was considerable discussion as to just what was best to do.

On motion of Judge McAlvay, the Board voted to give Mr. Davis temporary employment at \$40 per month, until the next regular meeting of the Board.

On motion the secretary was authorized to print an edition of 10,000 copies of the Board's leaflet on the "Restriction and Prevention of Measles."

On motion the secretary was authorized to reprint the leaflets Nos. [226] and [227], not to exceed ten thousand copies of each, if it shall be found the leaflets are needed in the work of the office."

The secretary presented the subject of the need of a leaflet on the "Restriction and Prevention of Small-pox." No formal action was taken.

The secretary presented a proposed announcement for the Detroit sanitary convention.

On motion of Prof. Fall, the Board voted to authorize the president and secretary to print the announcement.

The secretary presented the subject of the members of the Board taking part at farmers' institutes this winter. He stated that the superintendent of institutes wishes to know what part the members of this Board will take.

Prof. Fall said he would be willing to do what he could, and would take part in any institute in his portion of the State providing it was not

necessary for him to lose day time during the first five days of the week. He would probably also be able to fill engagements evenings when he could go and return after and before sessions of the college.

Doctor Milner could go occasionally an evening when the institute was not far distant from Grand Rapids.

Doctor Novy expressed about the same opinion as did Prof. Fall.

Doctor Belknap expressed himself as did Doctor Milner.

Mr. Wells said the time in the week did not make very much difference with him; he would do what he could at any time.

Judge McAlvay said he would be very busy, and would be unable to take part this year.

Doctor Baker would do what was practicable at any time.

The letters, and the corrected manuscript showing suggestions by different members relative to the "Data and Statements" prepared by Prof. Fall, were referred to Prof. Fall.

The subject of the proposed pamphlet "Data and Statements" being prepared by Prof. Fall for use by teachers, was discussed, each member suggesting some way in which he thought the proposed pamphlet might be improved.

On motion of the secretary, the Board voted to give Prof. Fall additional time in which to perfect the proposed pamphlet, that each member send to the secretary as soon as practicable his suggestions in writing, the secretary to send these suggestions to Prof. Fall.

The secretary read the proposed program for the Detroit sanitary convention as arranged by the program committee. The Board discussed the part each member was to take.

The secretary presented and read a number of letters he had received in reply to the invitations sent out to ex-members of the Board to attend and take part in the proposed Quarter-Centennial Celebration.

The secretary presented the manuscript of a paper he had read before the National Conference of State Boards of Health at Nashville, Tenn., August, 1897, on "How Far Should Mandatory Measures Go in Dealing with Measles, Whooping-Cough, Leprosy and Tuberculosis." The Board voted to publish the paper in the annual report of the Board for 1898. [The paper is printed in this annual report.]

On motion of the secretary, the Board voted that the subject of the quarter-centennial celebration of the establishment of the Board be made a special order for the next regular meeting of this Board.

On motion it was voted:

That each member report at the next meeting his view of the plan of the meeting, and the program for the quarter-centennial meeting.

The secretary was directed to include in the call for the next regular meeting this action of the Board, as a reminder to the members; it was also directed that the call be issued at least ten days before the time for the meeting.

On motion, the Board voted to direct the secretary, if the work of the office will permit, to prepare "accurate comparative statements of the conditions affecting the public health, and of the actual conditions of health in Michigan, before and since the establishment of the Board, especially exhibiting, if it be true, that there has been a very marked improvement in the healthfulness of Michigan in recent years," for the quarter-centennial, in accordance with the concurrent resolutions passed

by the legislature of 1897. [This was partly fulfilled in the Reprints Nos. 472, 495, 505 and 512, issued by the State Board of Health.]

The subject of the clerical force of the office was discussed.

The subject of raising the salary of some of the clerks was presented. After considerable discussion, on motion of Judge McAlvay, the Board voted to place the salary of Mrs. Breck and Mr. Reed at \$75 per month, and that of Mr. Hudson at the rate of \$1,000 per year.

The secretary presented a proposed report of the examination of the plans for proposed new buildings at the Home for the Feeble Minded at Lapeer. The examination was made at the special meeting in Detroit, Sept. 16; but, on account of a death in his family, the secretary had as yet been unable to perfect them to his satisfaction so that he could send the proposed report to the members of the Board for approval.

The secretary read the proposed report he had prepared, and members of the Board suggested amendments which the secretary said he thought would enable him to complete the report.

[The report is printed on preceding pages of this annual report.]

On motion the Board adjourned at 7:00 P. M.

SPECIAL MEETING, DETROIT, DEC. 9 AND 10, 1897.

Pursuant to a call by the president a special meeting of the Board was held at the Hotel Cadillac, during the intervals between the sessions of the Detroit sanitary convention.

The members present at this meeting were: Hon. Frank Wells, Prof. Delos Fall, Judge Aaron V. McAlvay, Doctor Fred Belknap, Doctor Frederick G. Novy, and Secretary Henry B. Baker.

On motion, the Board voted to allow the vouchers of members in attendance, subject to the certificate of the member, and signatures of president and secretary.

On motion the Board voted to allow the expenses of Mr. Theo. R. MacClure, incurred in attending and assisting at the convention, subject to the certificate of the secretary and signatures of the president and secretary.

The secretary presented the question of the publication of Mr. MacClure's paper on "Bicycling: From Social, Business and Healthful Standpoints," with especial reference to the "healthful standpoint." On motion the Board voted to publish the paper in the proceedings of the Detroit sanitary convention.

The secretary presented and read letter from Dr. M. J. Conant, and petition of citizens of Tawas City asking for a sanitary convention to be held in that city. The subject was discussed at length.

On motion of Prof. Fall, the Board voted to send Secretary Baker to Tawas City to make arrangements for the proposed convention.

On motion of Prof. Fall, the following resolution was unanimously adopted:—

Resolved, That when plans for public buildings are to be examined and it is practicable to do so, the State Board of Health hold its meeting at the place where the proposed building is to be erected.

On motion, the Board voted to publish in the proceedings of the Detroit sanitary convention the paper prepared by Doctor Leartus Connor of Detroit, providing Doctor Connor is willing. [Doctor Connor had been

asked to prepare a paper for the Detroit convention; but, later, it was found necessary to condense the program, and by his request Doctor Connor's paper was not read.]

Judge McAlvay mentioned that those who take part in farmers' institutes in Michigan receive railroad transportation at one and one-half cent rates. On motion of Judge McAlvay, the secretary was requested to write the secretary of the Michigan passenger agents' association and ascertain if this Board could not receive similar rates during its sanitary conventions.

Mr. Wells suggested that at the next meeting of this Board the subject of the proposed quarter-centennial celebration be made a special order.

Secretary Baker presented the subject of a local committee of citizens of Detroit to aid in making arrangements for the proposed quarter-centennial meeting. Names were mentioned as proposed members of that local committee.

The secretary suggested a badge or button for the quarter-centennial, which could be used as a souvenir of the occasion.

The secretary mentioned that he had in process of preparation a leaflet stating the objects, work, members, etc., of the Board, that he thought ought to be printed in the shape of a folder and widely distributed. In this connection he mentioned a folder the Agricultural College had widely distributed, and the college had profited thereby.

On motion of Prof. Fall, the secretary was directed to prepare and print such a folder.

REGULAR MEETING AT LANSING, JAN. 14, 1898.

Informal Meeting, of State Board of Health and Funeral Directors.

Previous to the time for the regular meeting, members of the Board held an informal meeting with the following named funeral directors: C. M. Ranger of Battle Creek, C. C. Merritt of Greenville, P. H. O'Brien of Grand Rapids, W. W. Bennett of Jackson, and M. J. Buck of Lansing. H. P. Dearing, general baggage agent of the Michigan Central railroad also was present, and spoke for the national association of general baggage agents. The subject under discussion was the proposed change in the rules of the general baggage agents' association relative to the transportation of dead bodies. Under the present rules the transportation of diphtheria corpses is prohibited absolutely; the railroads will not take them if prepared under the most careful conditions. The proposed new rules of the association of baggage agents provide that diphtheria corpses will be taken if prepared in a certain way and the preparation of the dead body "must be done by an embalmer, holding a certificate as such, approved by the State Board of Health, or other State health authority."

Representative funeral directors appeared before the State Board of Health to suggest a plan whereby the proposed new rules could be carried into effect, they wishing to secure permission to show that they are qualified to embalm, disinfect and prepare a corpse dead of diphtheria so as to make it safe for transportation. And the State Board of Health wished regulation of the subject, so as to lessen the

danger of the transportation of diphtheria corpses with no safe-guard whatever, as is believed sometimes occurs under pressure from bereaved relatives, the cause of death being alleged to be from some non-contagious or non-infectious cause. The general officers of the railroads want safety to the railroad employees and their families, and safety of the public and consequent immunity of railroads from prosecutions for alleged introduction of disease into localities.

It was proposed to have a committee of the State Board of Health to act with a committee of funeral directors to examine and recommend the State Board of Health to give certificates to embalmers who are qualified to do such work. Members of the Board of Health objected to taking on duties other than those required by law, but were anxious to comply with any requirements in the general act establishing the Board. Some thought this new work might properly be done under that act, which places in the hands of the Board the general supervision of the health and life of the citizens of Michigan.

After considerable discussion, the informal meeting adjourned to give opportunity for the State Board of Health to go into regular session. What action the State Board of Health took will be found later on in these minutes.

Morning Session, at 11:00 A. M.

The meeting was called to order at 11:00 A. M. by President Wells. Every member was present, as follows: President Frank Wells, Prof. Delos Fall, Judge A. V. McAlvay, Doctor Samuel G. Milner, Doctor Fred R. Belknap, Doctor F. G. Novy, and Secretary Henry B. Baker.

The secretary read the minutes of the last regular meeting of the Board. The minutes were approved as read.

The secretary read the minutes of the special meeting of the Board held at Detroit, December 9 and 10, 1897. The minutes were approved as read.

State Board of Health (school) vouchers numbers 10 to 15, inclusive, were allowed.

State Board of Health (regular) vouchers numbers 2826, 2844, 2847, 2859 to 2879 and 2881 and 2882 were allowed.

The members gave notice of items of business they wished to present to the Board.

The secretary read a list of fifteen items of business he wished to bring before the Board if opportunity presented.

On motion, the discussion of the proposed change in the rules for the transportation of corpses, was made a special order for the first thing in the afternoon session.

On motion of Judge McAlvay, the Board took a recess from 12:30 to 1:15 P. M.

Afternoon Session, at 1:40 P. M.

The same members were present that were present at the morning session. The first business was the special order, the proposed changes in the rules of the general baggage agents' association relative to the transportation of corpses.

The secretary mentioned that recently he had had considerable correspondence with H. P. Dearing, general baggage agent of the Michigan Central Railroad, and with representative funeral directors in Michigan concerning the transportation of corpses.

The secretary read the proposed new rules; and then the Board considered the rules section by section.

Doctor Milner expressed the view that the Board had no authority. Judge McAlvay and others thought the Board had authority under the act establishing the Board. But no legal authority was needed. The enforcement of the rules laid entirely with the railroad authorities, and their enforcement was more likely than if they were State law; violation of any rule would probably mean the discharge of some employee. The secretary mentioned that the Board had never formally authorized the work, but for many years past the transportation of *disinterred* bodies had been under the supervision of the secretary of this Board. He asked the attention of the Board to Section 6 of Rule 52 of the present rules of the General Baggage Agents' Association, and to what he had required before issuing a statement which had served as a transit permit, and he expressed the belief that the rules had done considerable to protect the public health and life. He said that the proposed new rules were an advance in this direction, and permitted the transportation of diphtheria corpses under certain conditions.

The proposed new rules were carefully considered, and generally discussed.

On motion of Prof. Fall, the Board voted to approve the new rules, identical with the rules adopted by the National Conference of State Boards of Health, at Nashville, August, 1897, and directed that the secretary secure a perfect copy of the rules approved by the National Conference correspond with the secretary of that Conference with a view of State Boards of Health.

The question then was how could the rules best be put in effect. It was suggested that a committee of this Board take full charge of the regulation, and it was also suggested that this Board appoint a commission to act under the direction of a committee of the Board.

Doctor Belknap moved that a committee of the Board should take the subject under advisement and report at a subsequent meeting.

Doctor Baker offered an amendment to Doctor Belknap's motion, to read as follows: That in order to carry out the intent of the new rules of the general baggage agents' association, a commission be appointed by this Board to consist of seven members—three members of the State Board of Health and four representative funeral directors of Michigan—to take the subject under advisement and report to the Board at its next regular meeting a plan by which the rules of the general baggage agents' association could be carried into effect.

Bearing on the question whether the majority of the committee should be from this Board or from the funeral directors' association, the secretary mentioned that it was already difficult to secure a quorum of the Board at its own meetings, and he did not believe that the Board should take up new duties that would interfere with the regular work of the Board. He believed that the most of the work could be done by the funeral directors, and their action could be approved or disapproved by this Board.

Judge McAlvay suggested that the Board had better be cautious, because he believed that the proposed action was not of sufficient import to hazard the Board's other interests. He spoke of the nature of the opposition that would be directed at the Board.

Prof. Fall suggested that a committee of this Board might have charge, but throw the work and responsibility upon the funeral directors.

Doctor Belknap expressed doubt of the advisability of the Board taking up the licensing of undertakers in Michigan.

Doctor Milner also doubted the advisability.

Doctor Belknap left at 2:30 P. M. to take a train.

Mr. Wells said—It seems to me that there should be no question whether this Board will antagonize some funeral directors. The question is whether lives can be saved. If there can be, this Board should undertake the work.

Mr. Dearing having come in, the Board asked him for his views. He said that he believed the work was in the line of public-health work, and he hoped the Board would undertake to do it, or to supervise the issuing of certificates.

Prof. Fall asked Mr. Dearing whether the railroad authorities would consent to have the Board supervise the work.

Mr. Dearing said that he thought so, providing the Board would be very careful to start the work on a high grade, and see that the grade was upheld. He thought the examination should be severe, and that very few funeral directors would be able to secure certificates until they had brushed up on their knowledge. "I do not urge immediate or hasty action, and if the Board cannot settle the question today, I would recommend that it wait until a subsequent meeting."

In this connection it was suggested that relative to the transit permit, the record of the registrar should appear instead of the coroner's certificate, and ought to be signed by the health officer instead of the clerk.

On motion of Prof. Fall, the secretary was appointed a committee to confer with Dr. Wilbur relative to a form for transit permit.

Judge McAlvay and Doctor Milner left to take a train for home.

Doctor Baker's motion was slightly changed, and the Board voted to refer the subject of the transportation of corpses to a committee of members of this Board and representative funeral directors.

Prof. Fall said that he recognized the feeling of the secretary that action should be taken at this meeting, in order that Michigan might take the lead in this line, as it had done in many other lines of public-health work.

On motion of Doctor Novy, the Board voted that the president and secretary should represent this Board on the committee just created, and that the meetings of the committee should be held in Lansing.

On motion of Doctor Baker, it was voted that C. M. Ranger of Bathe Creek be asked to serve on the committee.

On motion of Mr. Wells, the Board voted that W. W. Bennett of Jackson be asked to serve on the committee.

On motion of Dr. Baker, the Board voted that P. H. O'Brien of Grand Rapids be asked to serve on the committee.

On motion of Dr. Novy, the Board voted to ask Charles Benjamin of Saginaw, W. S., to serve on the committee.

On motion of Dr. Baker, the Board voted that John Dick of Detroit, be asked to serve on the committee.

President Wells called attention to an article read by Prof. A. B. Stevens* of the University of Michigan, before the Michigan state pharmaceutical association in 1897, on tests made by him of 32 samples of chlorinated lime obtained at random from various wholesale and retail drug stores in Michigan, all of which were below the standard of the United States Pharmacopœia, which requires the article to contain at least 35 per cent of available chlorine.

Prof. Stevens says: "The first ten samples packed in this State furnished an average of 9.07 per cent. The first eight were labeled 'high test.' Just why they were so labeled we are unable to understand. All were in metal cans. Nos. 11 to 15, inclusive, were of one brand and gave an average of 26.16 per cent. * * Nos. 16 to 22, inclusive, were of one brand and all in pasteboard boxes, with an average of 22.9 per cent. * * No. 29, one-quarter pound metal can, wet, 0.6 per cent. No. 30, sample had been kept in stock three years and kept in a loosely covered jar. Sometime before estimation it was transferred to a sealed jar. It was represented as being a very good sample because the odor from the jar was very strong, but on estimation yielded only 1.7 per cent. No. 31 was the last of a barrel which had been in stock one year, dry, yielded 0.4 per cent. No. 32 had been transferred from a barrel of jars, covered but not sealed, very damp, and yielded 0.7 per cent.

"Many erroneously judge the quality of chlorinated lime by the odor, which is very misleading. Several students depending upon the odor as an indication of quality rejected a number of packages containing 12 and 14 per cent, and accepted partially filled jars, the contents of which contained less than 2 per cent. A number of the poorest samples examined by the writer gave a very strong odor of chlorine. This is easily accounted for when we reflect that it is the decomposed hypochlorite or free chlorine that produces the odor and not that in combination. A very little decomposed hypochlorite is sufficient to fill a large jar with a suffocating odor of chlorine. No reliance can be placed upon anything short of a chemical estimation. * *

"As it is essential to the preservation of life and the progress of the arts that all drugs and chemicals should be not only of the purest character but of the required strength, it becomes the chemist and the pharmacist as guardians of the public welfare to decrease as far as possible the sale of inferior articles. * * To assist in this improvement I will, until our next meeting analyze and report, free of charge, upon every original package sent me by any brother pharmacist in our State."

Mr. Wells further said that he thought it was well for this Board to understand that chlorinated lime which it recommends and, to quite an extent, relies upon as a disinfectant, is rarely, if ever, of the proper standard of strength, and often inert. He did not suggest action to be taken by this Board upon this subject, but expressed the hope that the pharmacists of Michigan would find some means whereby this important article may be furnished of standard strength.

Mr. Wells also called attention to the methods employed by the health department of Chicago, in the disinfection of rooms. These methods are the results of laboratory experiments to discover the value for this purpose of sulphur fumigation. Mr. Wells read from the report of the department of health of Chicago for 1895-96, pages 250-252, as follows:

"Cultures are now regularly supplied to the fumigators to be exposed during fumigations. It is directed that the cultures be placed in different parts of the room and that the cotton plugs of some be left in place, while others be with-

drawn during the exposure. The cultures are prepared as follows: Each morning before the fumigators receive their assignments, the cultures to be used during that day are prepared. These are slant agar-streaked cultures of some well known species. The *Bacillus mesentericus vulgatus* and *Bacillus subtilis* are most frequently employed. These are used because of their well known resistance, and because there can be no danger to the fumigators should a culture tube accidentally be broken, which does not infrequently happen. When received by the fumigators there is no growth visible, the inoculation having been just made; the tubes are simply numbered. One similarly inoculated tube is always retained in the laboratory as a control. The fumigators carry the culture tubes in the ordinary form of Pillsbury microscope slide-box; the tubes are exposed, as was said, in different parts of the room to be fumigated, some having the cotton plug withdrawn, others with it in place. At the end of the period of fumigation they are returned to the laboratory with a slip giving information necessary for identification of the locality and work done. Sometimes the tubes are cultivated in the incubator, but more usually room temperature is used. This method of controlling the fumigations at once showed that the time of exposure to sulphur dioxide was frequently too short, and that the amount of sulphur used was often less than that actually required. Exposure less than four hours always showed incomplete sterilization. In a great many tubes bacteria failed to develop in the upper part of the agar, while an abundant growth occurred below, and those that had been exposed under pillows and covers generally grew over the entire surface. It was soon apparent that when less than four pounds of sulphur was burnt to the 1,000 cubic feet of space, only partial sterilization resulted. Entire sterilization of cultures exposed was uniformly accomplished with an exposure not less than six hours and a combustion of four pounds of sulphur for every thousand cubic feet of space in the rooms fumigated. All experiments were made, however, with the bacteria in a moist condition."

Mr. Wells suggested, in view of the results which the Chicago health department claims to have obtained, that four pounds of sulphur are required for every thousand cubic feet of air space to ensure the destruction of bacteria, it would be well for this Board to take some steps to learn if the three pounds of sulphur recommended by it are inadequate for the purpose.

Doctor Novy and Doctor Baker thought that the tests in Chicago were not so conducted that they were conclusive. They thought the subject an important one, and Doctor Novy mentioned some of the experiments he had recently made along the same line relative to sulphur fumes and relative to formaldehyde gas.

On motion of Prof. Fall, the Board voted that the subject just presented by Mr. Wells be referred to Prof. Novy, with request that he make tests which should determine the efficiency of formaldehyde, and sulphur disinfection, and that Doctor Novy be authorized to incur expenses not exceeding \$25.00.

Doctor Novy said that he believed that the opinion was quite general that rules of this Board prohibited the transportation of consumptive corpses. He said that some of the publications of this Board must give that impression, because he had heard complaint from a number of reliable sources.

Secretary Baker said that he believed that some such mistaken idea must be prevalent, and there was even a suspicion that the statistics of the office were being vitiated because of that misunderstanding, or one similar to it, as to placarding and isolating. He said that it used to be that 40 per cent of the card reporters saw and reported consumption, but the last Bulletin of Health showed that only 7 per cent of the observers had reported consumption. Something must be wrong somewhere, or there was a very remarkable lessening of consumption.

Prof. Fall thought the Board should prepare and distribute a circular which should clearly state the position the Board had taken on consumption, stating what the Board had done, and what it had not done.

The secretary said that the leaflet No. [175], and the slip [224] plainly stated the position the Board had taken relative to consumption, and that within the last week every newspaper in Michigan had received a marked copy of each.

Prof. Novy suggested that the consumption slip [No. 224] might be changed to include mention of the view of this Board relative to isolation, placarding, and transportation of corpses, in the case of consumption.

The secretary stated that during the quarter he had been called to give testimony in the Circuit Court at Pontiac in the case of a proposed cesspool about forty feet from a neighbor's well, and which was alleged to be dangerous to the health of those neighbors. His testimony was against permitting the cesspool; but, as he was there informed that many others existed, and new ones would probably be built, he had drafted preambles and resolution which disapproved of cesspools in general, and read as follows:

Whereas, It has come to the notice of this Board that, in at least one city in this State, cesspools are being constructed and proposed to be constructed, in close proximity to wells, the water from which is used for drinking purposes, such cesspools to receive sewage from water closets; and

Whereas, This State Board considers such a practice a nuisance and dangerous to the public health, because this method starts a water-carriage system where there is no possibility of promptly completing the removal before decomposition occurs, but it plans to store up fermenting human excreta together with great quantities of infected water, in receptacles which, though water-tight at first, must after a time overflow or leak, in which case, as they are in the earth, there is no probability of the detection of the leak, and, as they soon fill, their contents must, from time to time, be removed, at the risk of overflow, spilling, and the giving off of noxious odors; and

Whereas, Such a practice has been proved to be dangerous to the public health; as an instance, in the city of Munich, where when the privy pits had their sides and bottoms cemented, there was a reduction of the mortality from typhoid fever compared with the time when the bottoms were open, but a much greater mortality than after these were abolished and sewers and a general water-supply were supplied and used; therefore

Resolved, That this Board recommends to and urges upon all local boards of health in cities and villages in Michigan, where such practices occur or are proposed, that they make and publish under sections 1635 and 1639, Howell's Statutes, "Regulations," which, when so published, have the force of law, and which shall: (1) forbid the construction or reconstruction of any cesspool within one hundred feet of any well, the water from which is used for drinking or culinary purposes, however, such cesspool is constructed, which is to receive the contents of a water closet; (2) forbid the construction or reconstruction of any privy vault within one hundred feet of any such well; (3) require, or at least recommend, the use of the dry-earth closet and frequent removal of its contents wherever there is not a public water-supply and complete water-carriage disposal of excreta through sewers; (4) recommend, and so far as possible, secure the extension of the water-supply and public sewers, wherever this extension is practicable, to all residences or buildings where otherwise there are wells endangered by privies or cesspools; and (5) forbid the use of cesspools and privy vaults wherever it is practicable to obtain sewer connection.

On motion of Doctor Baker, the foregoing resolutions were unanimously adopted.

The secretary presented the question of reprinting the leaflet on the restriction and prevention of scarlet fever.

Prof. Fall suggested that at the bottom of page four, it be stated that the Board is now investigating the efficiency of formaldehyde disinfection, but is not yet ready to recommend its general use.

On motion of Doctor Baker, the Board voted to reprint the leaflet on scarlet fever, to the number of 10,000 copies.

On motion of Doctor Baker, the Board voted to reprint the leaflet on diphtheria, to the number of 10,000 copies.

On motion of Doctor Baker, the Board voted to reprint the leaflet on typhoid fever, to the number of 10,000 copies.

Mr. Wells suggested that these leaflets should be illustrated with engravings of the organisms that cause the disease, so far as practicable.

Prof. Novy mentioned that the tubercle germ was printed in the leaflet on consumption and that one of the germs showed spores. He suggested that another plate for that germ be made, so as not to show spores, because it is probable that no spores have yet been proved.

On motion of Prof. Fall, the leaflet No. [226], "Data and Statements," was ordered reprinted to the number of 10,000 copies.

The secretary mentioned that during the quarter he had made application to the fourth assistant postmaster general to have the printed proceedings of meetings of this Board entered at the Lansing postoffice as second class matter, at one cent per pound.

On motion the secretary was authorized to print the proceedings of this meeting in pamphlet form, not to exceed 2,000 copies.

Prof. Fall suggested that the printed proceedings be sent to newspapers.

The secretary presented Dr. McClintock's abstract of a report to this Board on "European Methods in the Production of Antitoxin and Vaccine." Because the report had already been printed in the Medical News, Oct. 30, 1897, and as the annual report was very crowded for space, the Board voted to ask Dr. McClintock to prepare a summary for publication in the printed proceedings of this meeting.

On motion the Board took a recess from 6:00 to 7:30 P. M.

Evening Session, at 7:30 P. M.

Members present: President Wells, Prof. Fall, Doctor Novy, and Doctor Baker.

The secretary presented a large number and read a few of the letters that the governor had received in reply to his invitations to attend the quarter-centennial celebration of the establishment of the State Board of Health; many of the letters accepted the governor's invitation.

The secretary presented the subject of a summer-resort directory, to be ready for use at the time of the quarter-centennial, and to be placed in the hands of Michigan's visitors at that time, setting forth the advantages in Michigan for healthful summer resorting. The visitors will be men who in their own states or provinces are authorities on questions of health resorts. The advertising that Michigan will receive will mean that thousands of dollars more will be brought into this State from outside states, particularly those south of us. The facilities Michigan has for summer resorting are unequaled by any other state; its immense lake line, and the innumerable small inland lakes, all go to make up an ideal summer resort State. Resolutions passed by the last

legislature, provide that the State Board of Health shall place such information strongly before the people, especially those residing outside of Michigan. It is expected that the people especially interested in summer resorts, including railroad and transportation companies, will have sufficient interest to see the proposal successfully and satisfactorily carried out, some of those officials already having signified a willingness to do what is consistent.

Prof. Fall expressed the thought that the utterances of the Board should be printed in the souvenir publication, which should be artistically illustrated with cuts supplied by those interested, and the expense of printing should be met by those connected with summer resorts, transportation companies, and others.

The subject was discussed at length.

On motion of Mr. Wells, the Board voted to authorize the secretary to send out an additional circular to proprietors and officers of summer resorts, such circular to include the one [240] previously sent out, and make it plain to all interested in summer resorts and to others that such a pamphlet souvenir would be printed and, unless their reports were sent in immediately, the resort or transportation company would not be represented.

On motion, the secretary was directed to communicate with the general passenger agents of railroads and steamship transportation companies likely to be interested in summer resorting in Michigan with a view of securing their views relative to the proposed summer-resort directory, and ascertain how far they would co-operate with the Board in the publication of such a pamphlet.

The secretary presented several pages of proposed "copy" that had been prepared for the proposed directory for summer resorts.

Doctor Novy thought that the map of Michigan that was to be included in the pamphlet should distinguish such cities as Detroit, Port Huron, etc., from summer resort cities. He thought one map should make it plain, by showing the lake line and inland lakes, that Michigan is truly a lake State.

It was proposed to make a statement of the total number of lakes, total area, etc.

Dr. Baker suggested that the map he exhibited, prepared by Mr. Bryant Walker, might be used by blacking the lakes.

The secretary mentioned that some 75 replies had been received out of some 400 copies of the blank [240] that had been sent out. He had had some of the information, especially relative to the difference between the summer and winter population, compiled for use in placing the proposition before those who will be likely to render financial aid.

On motion of Mr. Wells, the Board voted to direct that the secretary continue with the work he had begun, secure additional information, and have it compiled, to submit to the Board at a meeting to be called as soon as the work could be completed; the secretary to use his judgment of just what should be collected and compiled.

In this connection the secretary mentioned that the work of the office was being considerably increased, because of the proposed quarter-centennial meeting, and he asked that the Board should settle whether or not Mr. Davis was to remain in the office.

On motion of Mr. Wells, Prof. Fall acting as president pro tem, the

Board voted to retain Mr. Davis as temporary clerk, at a salary of sixty dollars per month, until further action by the Board.

The secretary asked whether advertising should be permitted in the proposed souvenir. Members expressed the thought that it should, providing it was on the subject of summer resorts and in a neat form.

Prof. Fall suggested that the secretary should supply the summer resort officials, and others, with a list of the persons likely to visit Michigan at the time of the quarter-centennial meeting.

The members agreed that the pamphlet should be limited to 100 pages, in order to have it not too bulky.

For the title page, it was suggested that the Michigan coat of arms be used, or perhaps it might be entitled "Michigan, my Michigan."

The subject of the program for the quarter-centennial celebration was presented by the secretary, and he outlined what he thought the program should be, somewhat as provided for by the action at Sand Beach in July, giving up the day to the work of the State Board of Health, and giving up the evening and night to our visitors, banqueting, etc. He read a long list of those he thought should take part in the evening exercises with short five-minute speeches, different ones should represent different institutions of learning, and departments of the national government, and national associations.

Prof. Fall suggested an entirely different idea. He thought the members and ex-members should take no part in the glorification of the Board's work. He thought the Michigan work should be shown up during the day, and in the evening there should be a short meeting, followed by a reception, banquet, etc.

Mr. Wells expressed the view that Doctor Baker's idea might be carried out.

Prof. Novy was in accord with Prof. Fall's plan. He outlined what he thought would make a program satisfactory to the Board, and satisfactory to the visitors.

While no formal action was taken, it was understood that the secretary would have the provisional program hektographed and sent to each member of this Board, asking for suggestions, and stating in the letter transmitting the provisional program that the Board had voted that the proposed program was to take the place of the action at Sand Beach where topics were assigned to different members.

The question of a local committee of arrangements consisting of Detroit citizens was discussed, and the following names were decided upon: Hon. Levi L. Barbour, Dr. Leartus Connor, Dr. Howard W. Longyear, Dr. J. E. Emerson, Dr. C. W. Hitchcock, Frederick K. Stearns, Chas. Wright, and H. C. Parke.

The secretary read a letter dated Jan. 10, in which Mr. Theo. R. MacClure asked for a leave of absence for the six months ending April 1, 1899; and during his absence he requested that Mrs. MacClure be placed in the office.

On motion of Prof. Fall, the Board voted that Mr. Theo. R. MacClure be granted leave of absence without salary for the six months ending April 1, 1899.

On motion of Prof. Novy, it was voted that Mrs. MacClure be employed in the office as a clerk, beginning Oct. 1, 1898; at a salary, on the start, of fifty dollars per month.

The secretary presented invitations he had received for the Board to hold sanitary conventions at Coldwater, Saginaw, and Mt. Pleasant. No formal action was taken.

Prof. Fall said that Prof. Novy and himself had not had sufficient time to prepare a report to the Board upon the State supervision of the purity of the inland waters, looking to legislation upon the subject. He said that Prof. Novy and himself would try and make a complete report to the Board at its April meeting.

On motion the Board adjourned at 12:55 midnight.

SPECIAL MEETING, FEBRUARY 25 AND 26, 1898.

The State Board of Health met in special meeting at Lansing, during the evening of February 25 and morning of February 26. The meeting was called to order by President Frank Wells. The other members present at the opening of the meeting were: Prof. Fall, Judge McAlvay, Doctor Novy, and Doctor Baker. (Doctor Belknap came in later.)

The secretary read the minutes of the regular meeting January 14, and the minutes were approved as read.

State Board of Health vouchers were allowed as follows:

From the school fund, Nos. 16 to 18, inclusive.

From the regular fund, Nos. 2880 and 2892 to 2904, inclusive.

The vouchers of the members for expenses in attending this special meeting, were allowed, subject to the certificate of the member.

On motion, it was voted that a committee be appointed by the Board to go to Detroit, confer with the persons mentioned at the last meeting, for the purpose of selecting a local committee of arrangements for the proposed quarter-centennial celebration; that the committee appointed by this Board be empowered to change the membership of the local committee if deemed advisable; and that the committee of this Board be authorized to make complete arrangements for the proposed meeting.

On motion of the secretary, the Board voted that Mr. Wells be chairman of the committee of this Board.

On motion of Judge McAlvay, it was voted that the other members of the committee be: The secretary, Prof. Novy and Prof. Fall.

Doctor Belknap came in at 10 o'clock P. M. and took his seat as member of the Board.

Doctor Baker offered the following resolutions:

Resolved. That the Quarter-Centennial Celebration of the Establishment of the Michigan State Board of Health, in accordance with concurrent resolution adopted by the legislature of 1897, shall be held in Detroit, August 9, 1898.

Resolved. That every effort be made by the officers and members of this Board to make this the most important and most useful Sanitary Convention ever held in Michigan.

Resolved. That the secretary of this Board is directed to ask every local board of health in Michigan to send at least one delegate, and that the secretary transmit to every local board a copy of the resolution of the legislature which reads as follows:

"Resolved further. That the local boards of health in Michigan be requested to send delegates to this proposed quarter-centennial meeting, in order that they may contribute, for the general welfare of the State, and that they may gain any information which they can for the use and benefit of the public health in their respective localities."

On motion, the foregoing resolutions were unanimously adopted.

The secretary presented the proposed program for the quarter-centennial celebration and the suggestions he had received from the members of the Board. The proposed program was discussed at length. The time given to authors of papers was shortened and the names of Prof. Kedzie and Doctor Vaughan were added; otherwise the program was not materially changed.*

On motion of Prof. Fall, it was voted to direct the secretary of the Board to correspond with and secure the acceptance of the persons proposed to take part at the quarter-centennial before their names be placed on the printed program.

At 11:30 P. M. the Board adjourned to meet again the next morning at 9:00 A. M.

Morning Session.

At 9:30 A. M. the Board was called to order by President Wells, and Prof. Fall, Judge McAlvay, Doctor Novy, Doctor Belknap and Doctor Baker were present.

On motion of Doctor Novy, the selection of the five-minute speakers for the quarter-centennial was left to the secretary and president of the Board.

The secretary presented proposed copy for an invitation and program to be sent to local health officials, and others, requesting that delegates be sent to the quarter-centennial.

On motion of Doctor Belknap, the Board directed the secretary to issue the invitation as soon as practicable, after making the changes directed by the Board.

The secretary read a letter dated February 12, which he had received from Doctor J. N. Hurty, secretary of the conference of State and Provincial boards of health.

On motion of Prof. Fall, the secretary was directed to write Doctor Hurty that it is the sense of this Board that the subject of "The Restriction and Prevention of Tuberculosis," is the most important topic which can be named for discussion at the next meeting of the conference.

The president presented and the secretary read the report† of the commission appointed by the Board to propose a plan by which the proposed change in the rules of the general baggage agents' association can be carried into effect.

The secretary read Doctor Milner's letter of February 24, in which Doctor Milner protested against the Board entering upon the licensing of embalmers.

After hearing Doctor Milner's letter, there seemed to be some question concerning the legality of the action of the Board.

On motion of Judge McAlvay, the report was accepted.

On motion of Prof. Fall, the Board voted to refer the question of legality to Judge McAlvay for his opinion, with request that his report be made at the April meeting.

The secretary read a suggestion, from Prof. E. A. Strong, that the State Board of Health issue a circular to schools, setting forth details

*The program and proceedings of the quarter-centennial celebration will be found printed in the supplement (Reprint No. 528) to the report of the Board for 1899.

† The report of the commission is printed on subsequent pages of this annual report.

for better sanitary conditions at schools, buildings, ground, etc. Prof. Strong having visited schools where the outhouses were not adequate, in bad condition, doors not large enough, etc.

On motion of Doctor Baker, the suggestion by Prof. Strong was referred to Doctor Milner,* chairman of standing committee on school hygiene and sanitation, with request that he report at the next meeting.

The secretary presented and read a suggestion from Louis P. Ernst, county school commissioner for Ottawa county. Prof. Ernst suggested that the State Board issue to commissioners of schools a circular giving specifications for changing ventilation of ordinary school houses by jacketed stoves, galvanized-iron pipes for foul-air shafts, etc.

On motion of Doctor Baker, the Board voted to refer the suggestion to Prof. Fall* with request that he bring to the the April meeting manuscript copy for such a proposed circular to school commissioners.

The secretary presented and read three pages of manuscript, being a portion of a paper in process of preparation by Mr. MacClure, which were submitted at the secretary's request. These pages suggested a detailed plan for "Teachers' Sanitary Institutes" or sections of regular county teachers' institutes, and a detailed plan for "Teachers' Sanitary Bulletins."

In this connection the secretary read the United States postal law relative to bulletins of State Boards of Health being sent out as second-class matter, and thought that the law could be made to cover most of the publications of this Board.

Judge McAlvay suggested that the secretary secure a ruling on the U. S. postal law relative to the part which refers to State Board of Health bulletins.

On motion of Doctor Novy, the suggestion relative to teachers' institutes was referred to Prof. Fall* with request that he report at the April meeting.

On motion of Doctor Baker, the suggestion relative to teachers' bulletins was referred to Doctor Novy, with request that he report at the next meeting.

The secretary presented and read resolutions relative to the bulletin of vital statistics being entered at the postoffice as second-class matter, the same as though it were published by the State Board of Health.

On motion, the preamble and resolution were adopted, and the secretary was directed to transmit a copy to each Michigan member of congress. (The letter transmitting the preamble and resolution is hektograph No. 1912.)

The secretary presented a paper which he had received from Prof. Fall. The paper was entitled "The Teaching of Hygiene and Sanitary Science in the Secondary Schools," published in the February, 1898, number of "The School Review."

On motion of the secretary, the Board voted to print the paper in the annual report of this Board for 1897, and that 10,000 reprints be ordered from the school fund.†

The subject of the proposed text-book in process of preparation by Prof. Fall, was mentioned; and, on motion of Dr. Baker, the Board

*See Letter Book No. 46, March 5, 1898.

†The paper is printed on pages cxiv-cxxi of the annual report of this Board for 1897, and as *Teachers' Sanitary Bulletin* for July, 1898.

voted that Prof. Fall be requested to secure from the members their criticisms, and that the text-book be completed ready for distribution at the time of the quarter-centennial celebration.

Doctor Novy, the committee to whom was referred the question of testing bacteriologically in the laboratory the efficiency of disinfection by the use of sulphur fumes and by the use of formaldehyde, made a preliminary report upon tests he had been making. The results seemed to show that formaldehyde will prove to be an efficient disinfectant when properly applied. Doctor Novy mentioned that he thought the day for sulphur disinfection had passed.

On motion of Dr. Baker, the Board voted that, in case Doctor Novy's report on efficiency of sulphur and formaldehyde be ready in time, his report be published in the annual report for 1897.*

The secretary presented and read a letter he had written to Doctor Gibbes, the new health officer of Detroit. He also read Doctor Gibbes' reply.

Prof. Fall left at 11:45 A. M., to take a train for home.

The secretary read a letter dated February 10, from Doctor Duffield, health officer of Detroit, relative to physicians not reporting cases of consumption.

The secretary read a newspaper clipping relative to the contagiousness of pneumonia. In this connection he remarked that he thought the Board would soon have to issue a circular on pneumonia.

Secretary Baker brought to the attention of the Board the death of Doctor Pietra Santa, Paris, France.

On motion, the following resolution was unanimously adopted:

Resolved, That the secretary of the Michigan State Board of Health be directed to convey to the family and friends of the deceased, the Board's heartfelt sympathies, and express the Board's high appreciation of the character and eminent services that Doctor Pietra Santa has given to public-health work.

On motion of Judge McAlvay, the secretary was directed to send to summer-resort officials a list of those persons likely to be present at the quarter-centennial celebration.

On motion of Judge McAlvay, the secretary was requested to have printed letter-headings for members.

The secretary presented the question of a stenographer for the evening session of the quarter-centennial celebration.

It was suggested instead that the secretary ask for the manuscript for the five-minute speeches to be given at the quarter-centennial.

The secretary presented the question of printing the papers the members had read at the farmers' institutes. The members thought they had rather not have them printed.

On motion, the Board adjourned at 12:40 P. M.

REGULAR MEETING, LANSING, APRIL 8, 1898.

The State Board of Health met in regular session at the office of the secretary, at 10:30 A. M., Friday, April 8, 1898. The meeting was called to order by President Wells, and besides the president, Judge McAlvay, Prof. Novy and Secretary Baker were present.

*This paper is printed on pages cxxix-cxli of the annual report of the State Board of Health for 1897, and as *Teachers' Sanitary Bulletin* for June, 1898.

The secretary read the minutes of the special meeting February 25-26, 1898, and the minutes were approved as read.

Secretary Baker said he had received a telephone message from Doctor Milner, saying that it would be impossible for him to come on account of sickness of Mrs. Milner.

This being the time for the annual address by the president of the Board, Mr. Wells read his address, as follows:

PRESIDENT'S ADDRESS.

BY HON. FRANK WELLS, LANSING, MICHIGAN.

Gentlemen of the Michigan State Board of Health: It seems fitting that organized bodies, like individuals, should from time to time consider the work upon which they have been engaged and what the results of such work have been, and, in the light of their experience and the conditions which confront them, decide in what direction their efforts shall next be directed.

This Board is expected to, and does, do this more or less at each of its quarterly meetings. The annual meeting which we hold today, should, it seems to me, be a special occasion for such action. It is in this spirit and with this purpose in view that the still greater occasion which we hope to celebrate in Detroit within a few months—the quarter-centennial of the creation of this Board—should be held.

It is a recognized law that bodies in motion move through lines of least resistance, that a road once traveled is more likely to be again traveled than a new one in a similar direction, that we are all prone to get into ruts from which it is difficult to extricate ourselves. It was, perhaps, with this knowledge in view, and with a hope that the attention of this Board might sometimes be called to special lines of work which otherwise would have been overlooked by it, that an address from the President of this Board was made a feature of each annual meeting. In complying with this requirement today I find it impossible to discover any ruts from which the Board should be pried out, or roads it should discontinue to travel. In this brief address I shall refrain from any consideration of the work of the Board during the past year. Such consideration seems unnecessary for the reason that during this period the meetings of the Board have been unusually well attended and you are therefore as familiar with this work as I am myself. I want to here congratulate the Board on the fact that its members have in so large proportion been present at its regular and special meetings. It evinces as nothing else can the interest they are taking in the work of the Board and is a most promising indication that such work is likely to prove of the greatest, practical value. Not only has the attendance at meetings been unusually good, but during my membership of the Board there has never been so much harmony among its members nor so little disposition manifested to make radical experimental changes in its organization and methods than during the past year. The best means for accomplishing the purpose for which the Board was created appears to animate today every member of the Michigan State Board of Health. It is pleasant to note in this connection that the personnel of the office has improved in the character of its work, in its harmony, and in the spirit which animates it. The quarter centennial which we are approaching marks not only therefore an epoch in the history of this Board, but it marks an era in its capacity for life-saving work. These conditions should inspire our hopes and make us most thankful.

Investigation of the Waters of the St. Clair and Detroit Rivers.

In considering the immediate future I shall content myself with calling to your attention a single subject which in the light of recent events seems to me of very great importance, and to ask that it be considered by you at this meeting. This is the setting on foot by this Board of some investigations concerning the condition of the waters of the river and Lake St. Clair and of the Detroit river. These investigations to consist of tests of these waters for pathogenic organisms at stated intervals during the year. While the recent outbreak of typhoid fever at St. Clair, amounting to about two hundred cases and many deaths, might in the absence of

other facts be regarded as due to some local cause whereby the water in the vicinity of the intake of the public water-supply of that city had become contaminated, yet these other facts seem to me of sufficient importance to justify a suspicion that the waters may have become thus contaminated before they reached that city.

The frequent outbreaks of typhoid and other enteric diseases among the inhabitants of the towns and cities who obtain their water supply from these rivers and lake, might be attributed to passing boats if it were not true that outbreaks of these diseases are not limited to the period of general navigation.

The sewage of all these inhabitants finds its way to this great water course, but the comparatively slow movement of the waters, their broad expanse and numerous channels, would seem to preclude the idea that serious danger could be expected from this source. For several years the United States government has been engaged in the dredging of Black river in order to render it navigable. This stream has for many years received the sewage of Port Huron. This sewage, together with mud, has been stirred up and raised from the bottom of this river, placed upon scows, carried into St. Clair river, and dumped below the city. It has been noted from time to time that outbreaks of typhoid fever in Detroit frequently followed within a few weeks the beginnings every year of the dredging at Port Huron. No systematic study of the facts had been made, however, so far as I am aware, until Mr. Gardner S. Williams, C. E., of the Detroit Water Works, made a long and very thorough investigation of the subject, including an investigation of the relative amount of typhoid fever in all that part of the State which might, by reason of sewage or otherwise, influence the amount of typhoid fever in Detroit. He prepared a paper on this subject, which he read at the Sanitary Convention held under the auspices of this Board in Detroit last December. Mr. Williams was convinced, and his facts seemed to warrant the belief, that a causal relation existed between the dredging of Black river at Port Huron and these outbreaks of typhoid fever at Detroit. If this relation did exist, it is easy to believe that the St. Clair sickness may have been a result of the same cause.

While it may be true that several months elapsed after the dredging of Black river at Port Huron ceased before the outbreak of typhoid at St. Clair culminated, yet the loose deposits from this source in St. Clair river may not have had time to solidify, and were liable, therefore, under the action of the winds and of thick moving ice, to become mixed with the waters of the river and be carried long distances by its current.

Possibly a case of typhoid fever at Port Huron in January may have been the source of the disease at St. Clair through the contamination of the waters of St. Clair river by sewage from Port Huron, just as the waters of Detroit river, becoming contaminated by the sewage of Detroit, undoubtedly cause the frequent outbreaks of typhoid fever in the towns and villages below Detroit.

To me it seems quite important that all these questions should, if possible, be answered. I am confident that the facts thus far learned warrant an investigation of the whole matter by this Board so far as its means will permit. The water at different points on the line of the waterway between Lakes Huron and Erie should be tested during the periods when the dredging operations are proceeding at Port Huron, and when they are not. The water of Black river and the material brought up by the dredge should also be tested. This work is not likely to be undertaken by any other authority than this Board. It should not be. The large extent of territory involved, the important questions to be settled, together with the means at our command for making the tests needed, at the Laboratory of Hygiene, point to this Board as the proper authority for conducting the investigation if it is made. The protection of the lives of the inhabitants of the towns and cities on the shores of this water course, and the numerous popular summer resorts upon its banks, are sufficient reasons for our undertaking this work, but there is, in addition, another important reason why we should do so. This is the learning, if possible, whether pathogenic organisms, especially such as cause typhoid and other similar diseases, may be carried long distances by water and retain their vitality.

I am aware of our lack of funds for conducting work like this, and I am also impressed with the belief that it should not be undertaken by us unless it can be done in a manner that will satisfy ourselves and command the respect of others when its results are shown. I believe the work may be well done without very great expense, and I hope steps will be taken by you to determine its feasibility and its cost at once.

Quarter-Centennial of This State Board of Health.

I am glad to be able to congratulate the Board on the forwardness of the work for the celebration of the quarter-centennial. The interest shown by prominent citizens of Detroit in this celebration indicates that the part they have assumed as entertainers will be most agreeable and satisfactory to all who may share the hospitality of the city at that time.

Events of the Year.

The year just closed has witnessed no serious outbreaks of any of the dangerous communicable diseases, if we except the one at St. Clair, to which allusion has already been made. The Board has held two Sanitary Conventions during the year, a very successful one at Tawas City and one at Detroit. At the latter city very valuable papers were read and interesting discussions held, but the meetings were not largely attended. One change has occurred during the year in the personnel of the Board. Dr. Granger of Bay City, owing to ill health, resigned as a member, and Gov. Pingree appointed in his place Prof. Novy, who is a most welcome member, and for whose appointment by the Governor we are all most unfeignedly thankful.

Thanking you, gentlemen, one and all, for the courteous and friendly treatment I have received at your hands, as your presiding officer during the past year, let me indulge in the hope that the year which begins a second quarter century of life-saving work by this Board may be even more prolific of good results than were those which have preceded it.

Judge McAlvay said that he thought the suggestions made by the president were of considerable importance; and, on Judge McAlvay's motion, the Board ordered the address printed in the pamphlet proceedings of the meeting, in addition to the annual report.

State Board of Health vouchers, from the regular fund, Nos. 2906, 2910 to 2928, inclusive, were allowed.

State Board of Health "School vouchers" Nos. 19 to 24, inclusive, were allowed.

On motion, the Board voted to allow Mr. Wells' expenses to Detroit incurred in making arrangements for the quarter-centennial, subject to the usual certificate of the president and secretary. (The expenses are on regular voucher No. 2927.)

On motion, the Board voted to allow a bill (regular voucher No. 2928) for the actual amount of postage used in the office during the first quarter of 1898, for the regular purposes.

Doctor Novy mentioned that at some time during the meeting he wished to report relative to "Teachers' Sanitary Bulletins," and relative to his experiments with the efficiency of sulphur fumes and formaldehyde for disinfection.

Judge McAlvay said he would report relative to the legality of the proposed action of the Board in connection with the transportation of corpses.

The secretary read a list of fifteen items of business he wished to bring before the Board if opportunity presented.

The secretary presented his quarterly report of work in the office during the quarter ending March 31, 1898. On motion, the report was received, and ordered printed in the pamphlet proceedings of the meeting.

In connection with the principal topic of the address by the president of the Board, the secretary mentioned that he had had several samples of water from the St. Clair river examined—from the river as it leaves

Port Huron, from the river opposite the intake at St. Clair, from the water works at St. Clair, from a tap in St. Clair, and from the river as it leaves St. Clair. All of the samples were found to be contaminated by disease-producing germs; and all but one promptly caused the death of animals, and that one made them sick. For the purpose of supplementing this work, the secretary had urged the mayor of Marine City, and the president of the village of Algonac, to act under Act 43, laws of 1897, for having the water of their respective places tested at the University, at cost. He had also urged the engineer of the Detroit water works, and the health officer of Detroit, to have daily bacteriological tests made of the water supplied that city. The secretary coincided with the president in the belief that useful results would follow the investigation proposed.

Judge McAlvay said that he believed the investigation would be extremely valuable, but the question with him was where was the money to come from.

Prof. Novy remarked that the work would be expensive, that the samples should be collected with more or less regularity, and by some competent person, preferably the person who was to make the tests. He also thought the tests should be made of samples collected before, during and after the dredging at Port Huron, and that samples should be taken every half mile or so, down the St. Clair river.

The secretary presented a postal card from Doctor Cattermole which stated that he would be ready for work April 12.

The secretary presented a letter dated April 5, from James G. McHenry, the clerk who left the office last fall to attend the University with an understanding that he was coming back during his summer vacation.

On motion, it was voted that Mr. McHenry be employed during his summer vacation in 1898.

On motion, the Board took a recess from 12:30 to 1:30.

Afternoon Session, at 1:30 P. M.

The same members were present as were present at the morning session.

The subject of the proposed investigation of the water in the St. Clair and Detroit rivers was again presented.

Judge McAlvay said that in order to get the subject before the Board, he would make a motion that the Board undertake the investigation, and that a sum not exceeding two hundred dollars be appropriated for the purpose, the money to be expended at the discretion of the president and secretary, if they find it practicable to make the investigation as outlined. After some discussion the Board adopted Judge McAlvay's motion.

The secretary presented an application and a number of recommendations relative to Austin F. Burdick securing temporary work in the office. After consideration, on motion of Judge McAlvay, it was voted that Mr. Burdick should come into the office as temporary clerk during the months of July, August and September, to start at \$40 per month, his salary not to be increased above \$60, at the discretion of the secretary.

Prof. Novy, special committee to whom was referred the question of the relative and actual efficiency of disinfection by sulphur fumes and by formaldehyde, made a written report of a very thorough experimental investigation, the results of which will make room disinfection much more easy and less destructive of valuable articles. [The report is printed on pages cxxix-cxlvii of the annual report of the Board for 1897.]

On motion of Doctor Baker, the Board voted to print Prof. Novy's report in the annual report and also as a teachers' sanitary bulletin, to be sent to teachers, health officers, physicians, and others interested in the educational work. [It is the bulletin for June, 1898.]

The secretary presented a statement relative to diphtheria in Galien, and also mentioned that Senator Blakeslee had expressed the wish to appear before the Board. (Mr. MacClure was sent for Senator Blakeslee, but the senator said he could not possibly appear before the Board because of pressure of important business in the Senate.) The secretary said that he had written numerous letters on the subject. Members of the Board expressed the view that everything had been done that it was practicable to do; and, as long as the local health authorities did not request the Board to send a representative, no representative ought now to be sent.

The secretary presented a number of communications which he had received from civil engineer B. F. Bush of Grand Blanc, Michigan, in which Mr. Bush proposed and advocated an aqueduct from Lake Huron, to supply pure water to Detroit, St. Clair and other cities in southeastern Michigan. [These letters will be found in hektograph No. 1938.]

The communications were referred to the special committee, consisting of Prof. Fall and Prof. Novy, on the "Disposal of Sewage and the Purity of Water Supplies."

Secretary Baker presented Doctor Ranney's report of an investigation of an alleged outbreak of typhoid fever at St. Clair. [The report is hektograph No. 1921, and will be found printed in the annual report for 1898, in connection with the article on "Typhoid Fever in Michigan in 1897."]

Judge McAlvay, special committee to whom was referred the question of the legality of the proposed action of the Board in connection with the regulation of the transportation of corpses, made a written report which questioned the Board's proposed action in accordance with the report of the commission on that subject. [Judge McAlvay's report will be found printed in this annual report, in connection with an article on "Transportation of Dead Bodies."]

On motion of Doctor Novy, the report of the committee was accepted, and placed on file, and the committee discharged from further consideration of the subject.

Judge McAlvay, committee on legislation, reported verbally on the question submitted to the Board by Doctor Milner, relative to healthful conditions at summer resorts, etc., that he had given the subject considerable thought. The plan proposed is that there shall be a state sanitary inspection of summer resorts, in order that the sewerage, drainage, water-supply and other safeguards for the prevention of sickness and deaths at such places shall be of the most approved kind. Judge McAlvay said there should be a legislative enactment, sufficiently general to be applicable to all summer resorts.

Doctor Novy, special committee to whom was referred the proposed teachers' sanitary bulletins, reported that the proposition was an excellent one, and the educational value of such short bulletins would be great. He thought the publication of such leaflets would keep the educational forces throughout the state in constant touch with the results of recent sanitary researches.

No further action was then taken, because the secretary had previously placed the subject before the members of the Board by letter, and it was unanimously agreed that in case of a favorable report from Doctor Novy, the work should be commenced without delay.

The secretary presented an amended copy of the proposed program for the quarter-centennial celebration.

On motion, it was voted that Doctor Walter Wyman be asked to make a five-minute address.

On motion, the Board voted that Doctor John B. Hamilton be requested to make a five-minute address.

On motion, the Board voted to ask Doctor D. E. Salmon to make a five-minute address.

The completion of the program was understood to be in the hands of the president and secretary.

The president and secretary reported progress in the different lines of preparation for the quarter-centennial celebration. They stated that they had visited Detroit, and conferred with a committee of representative citizens to ascertain whether or not the city wished to make any preparations. The meeting was held at the Hotel Cadillac, at which representative citizens were present, and a general committee of arrangements was appointed.

The president extended to the Board his invitation and offer of hospitality at Sand Beach for the July meeting.

Secretary Baker presented a letter of March 25, and a letter of April 4, from Prof. Harriet A. Marsh, president of Hancock school mothers' club, of Detroit, in which the secretary was requested to read a paper before the state convention of mothers' clubs, in Detroit, May 3 and 4.

The secretary presented and read two letters dated March 18, 1898, from J. de Pietra Santa of Paris, acknowledging the resolutions of sympathy relative to death of his father, which were passed by the Board at its meeting February 25 and 26, 1898.

The secretary presented a letter dated April 8, from W. C. Haines, in which Mr. Haines communicated to the Board his view of how best to obtain annual reports from local health officers, by an amendment to the law, placing a penalty upon non-compliance.

Secretary Baker recommended instead, that an effort be made to so amend the law that compensation would be made to every health officer who made a complete report in compliance with the law. He said that there are about 1,500 local health officers, being about the same number as the local registrars who report to the Secretary of State the deaths within their jurisdictions. The registration law provides for the payment of a small fee for each correct report. The result is that nearly every local registrar in the State now reports the deaths as the law requires. He believed that if the same principle were applied to the reports to the State Board of Health by health officers, it would result in proper compensation to those local officers, and in correct and complete

reports, which would advance the interests of public health throughout Michigan.

The members of the Board seemed to agree with the secretary's view, but no formal action was taken.

The secretary mentioned that he had received from Prof. Marshall an invitation to go to the Agricultural College this evening and listen to an address by Doctor Novy. He thought of going, and invited the other members of the Board to accompany him.

On motion, the Board adjourned at 5:40 P. M.

SPECIAL MEETING, LANSING, MAY 13, 1898.

A special meeting was held in Lansing, May 13, pursuant to a call by President Wells for the purpose of the examination of plans and specifications for proposed new buildings, and for the transaction of such other business as might come before the Board.

The meeting was called to order at 9:30 A. M. by President Wells, and the following other members were present: Doctor Belknap, Doctor Milner, and Secretary Baker. (Prof. Fall came in and took his seat at 11:00 A. M.

On motion, the Board took up the regular order of business, until the plans were ready to be examined.

The secretary presented the minutes of the regular meeting held April 8. On motion, the reading of the minutes was dispensed with.

Doctor Belknap mentioned that he had been called to Galien to assist in the prevention of the further spread of diphtheria.

State Board of Health regular voucher numbers 2930 to 2937, inclusive, were allowed.

State Board of Health school vouchers numbers 25 to 28, inclusive, were allowed.

Doctor Milner reported progress on his work as special committee relative to sanitary condition of school houses, and thought he would be able to make his report at the July meeting.

The secretary read a list of fifteen items of business he would bring before the Board if there was opportunity.

Doctor Samuel Bell, medical superintendent of the Upper Peninsula Asylum for the Insane, at Newberry, appeared before the Board with plans and specifications for a proposed new cottage dormitory. The Board thoroughly considered the plans and specifications; and, with a few exceptions, the plans were approved, and the Board made several recommendations where improvement might be made. [The report of the examination of the plans is printed on a preceding page of this annual report. It is hektograph No. 1940.]

President Wells suggested that it would be well for this Board to prepare and publish a statement of just what the Board has recommended in the past relative to what the plans for proposed buildings should include relative to sewerage, ventilation and heating. He thought such a statement would enable the architects and boards of control of State institutions to make their plans after the most improved methods.

On motion, the Board took a recess from 12:15 to 1:15 P. M.

Afternoon Session, at 1:30 P. M.

President Wells, Doctor Belknap, Doctor Milner, Prof. Fall and Secretary Baker were present.

The secretary presented the fifth edition of the leaflet on the restriction and prevention of consumption, stating that some amendments were necessary, and asking that the leaflet, when amended, be printed for immediate use. The Board considered the proposed amendments, made a number of amendments, and directed the secretary to reprint the amended leaflet (from the school fund) to the number of 10,000 copies.

Secretary Baker presented a machine for addressing envelopes—an addressograph—which had been placed in the office on trial. He stated that it was necessary for the office to have some such machine in order to facilitate the work of addressing the envelopes for the teachers' sanitary bulletins. The members viewed the machine carefully. Prof. Fall suggested that he had seen a machine that he thought would be much cheaper and more practical. He was requested to send the secretary the details relative to the machine.

On motion of Doctor Belknap, the Board voted to instruct the president and secretary to buy the addressograph, with accessories, providing some better machine cannot be secured.

The secretary mentioned that during the interval of meetings he had consulted with the president, and together they had decided it was necessary to employ some person to address envelopes for the teachers' sanitary bulletins, that the person was Mrs. Edna Cleland, that she had been kept very busy, and that her salary had been fixed at one dollar per day.

On motion of Prof. Fall, the Board confirmed the action of the officers, and voted that Mrs. Cleland be continued, providing her services were found essential.

The secretary presented a proposed badge for the quarter-centennial celebration and meeting of conference of state and provincial boards of health to be held in Detroit August 9-11. The proposed badge was a sample, submitted by Whitehead and Hoag of Detroit.

On motion of Doctor Milner, the Board voted that the secretary be requested to write Doctor Charles W. Hitchcock, chairman of the printing committee, and express to him the Board's entire satisfaction with the sample submitted by Whitehead and Hoag.

On motion of Doctor Milner, the Board directed its president to appoint a committee of three of its members to prepare a statement of the best systems of house drainage, heating and ventilating, with a view of placing the statements in the hands of and thus aiding the several superintendents and boards of control of state charitable, penal, educational, and reformatory institutions in Michigan, to prepare plans for buildings which shall be in accordance with the best modern methods of sanitary construction.

President Wells appointed Doctor Milner, Prof. Fall and Secretary Baker, to serve on the committee authorized by Doctor Milner's motion.

The secretary exhibited sample engravings he had received for the proposed souvenir in process of construction. While no formal action was taken, it was suggested that samples be secured from the Franklin Engraving Company, and that the secretary order the engravings from the firm from which he could secure the best work and price.

On motion of Doctor Baker, a bill for dues (\$10.00) in the conference of State and provincial boards of health, was allowed; the bill being made out to Doctor Elzear Pelletier, Treasurer.

Doctor Milner left home at 3:10 P. M.

The secretary presented and read a letter which he had received from C. J. Strang, secretary of the printers' union, asking that the union label be placed on the Board's printing.

Secretary Baker presented and read a letter dated May 12, from Doctor Samuel P. Duffield, ex-health officer of Detroit, in which Doctor Duffield did not seem inclined to make a perfect annual report in accordance with the law. The Board took no action, suggesting that it would probably not be worth the trouble, so long as he was no longer health officer.

Doctor Belknap mentioned that there had been considerable trouble in restricting measles in Niles, he believed principally from the lack of co-operation of citizens and physicians with the health officer. He believed the physicians would make better effort if they could secure the co-operation of their patrons. Doctor Belknap suggested that he might prepare for publication in a local paper an article that he had had in mind, but would submit it to the secretary before publication.

Secretary Baker said that such an article would be of value, and also suggested that it might be used outside of Niles in various parts of the State.

The plans and specifications of a proposed new dormitory cottage at the Home for the Feeble Minded at Lapeer, were presented and examined by the Board. With a few exceptions the plans and specifications were approved. [The report of the examination is printed on a preceding page of this annual report. It is hektograph No. 1946.]

On motion of Doctor Belknap, the secretary was given leave of absence from the office for 10 days or two weeks to visit his "farm."

The secretary presented letters from Coldwater, Saginaw, and Mt. Pleasant relative to holding sanitary conventions, but no formal action was taken.

On motion, the Board adjourned at 5:30 P. M.

WORK OF THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1898.

For each regular meeting of the State Board of Health the secretary prepares a report of work done in the office during the quarter just preceding. The abstracts of these are collected and published here, instead of with the proceedings of the meetings, in order to bring the reports of work in the office all together. Following these quarterly reports, will be found a summary for the year, and a general report for the year; prepared however, on a different plan, not repeating the details stated in the quarterly reports, but outlining the nature of the work, and including copies of leaflets and other short publications issued by the office during the year.

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK
DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND
OF THE CONDITION OF HEALTH GENERALLY IN MICHIGAN
DURING THE QUARTER ENDING SEPT. 30, 1897.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: For diphtheria, 111; for scarlet fever, 52; for typhoid and typho-malarial fever, 128; for measles, 100; for whooping-cough, 30; and for consumption, 46. Total for the six diseases, 467.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 2,455.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the quarter to the number of 2,003.

The "final" reports of outbreaks received and filed during the quarter were: For diphtheria, 93; for scarlet fever, 68; for typhoid and typho-malarial fever, 46; for measles, 197; for whooping-cough, 23; and for consumption, 27. Total for the six diseases, 454.

During the quarter, the local columns of 1,675 newspapers have been looked over for reports of occurrence of communicable diseases. (This work is done by the clerk, who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 2 outbreaks of diphtheria, 1 outbreak of scarlet fever, 12 outbreaks of typhoid and typho-malarial fever, 7 outbreaks of measles, 2 outbreaks of whooping-cough and nine cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE 1.—THIRD QUARTER OF 1897.—*Exhibiting the number of outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-cough and Consumption from July 1 to September 30, 1897, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, July 1 to Sept. 30, 1897.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria.....	111	2	50	0	50
Scarlet Fever...	52	2	100	0	0
Typhoid Fever...	128	9	33	25	42
Measles.....	100	7	29	28	43
Whooping-cough	30	7	0	50	50
Consumption....	46	20	56	0	44
Small-pox.....					
Average for the six diseases.....		7	39	18	43

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the director of the Michigan Weather Service at Lansing, for his use; it is sent by him to the chief of the U. S. Weather Bureau at Washington, D. C.

Ozone test-paper sufficient to last three months was sent to each of 10 meteorological stations making observations for this office.

Diagrams and maps were made to illustrate articles in the annual report of this Board, as follows:—

Map—Distribution of Measles in Michigan, 7 years, 1889-95.

Map—Distribution of Typhoid Fever in Michigan, 7 years, 1889-95.

Map—Distribution of Scarlet Fever in Michigan, 10 years, 1886-95.

Map—Distribution of Diphtheria in Michigan, 10 years, 1886-95.

Diagram—Number of cases of sickness and deaths from different communicable diseases in Michigan per 10,000 population, annual average.

Diagram—Numbers of outbreaks of which the beginnings were stated, for Diphtheria, Scarlet Fever, Typhoid Fever and Measles.

Compiling, Editing

The compilation of data on meteorological registers from observers at 19 stations in Michigan for the year 1896 is nearly finished, and registers from observers at each of 15 stations have been received and examined for the year 1897, and some compilations of the data on them have been made.

The compilation of the reports from all sources relative to scarlet fever in 1896 has been made and proved; the compilation relative to typhoid fever in Michigan in 1896 is about one-third completed; the compilation relative to diphtheria in 1896 has been completed and the compilation proved; and the compilation relative to consumption in 1896 has been made and proved.

The index for the annual report for 1896 has been made, proved and printed.

For the annual report for 1897, the only article now so far completed as to be awaiting the editorial work of the secretary before being ready for the printer, is the one on consumption. The articles relative to diphtheria and scarlet fever are about two-thirds completed. The articles "Time of Greatest Prevalence of Each Disease in Michigan in 1896," and "Meteorological Conditions in Michigan in 1896," are each about one-half completed, and will probably not be completed much before January 1. Very little has been done on arranging the manuscript for the "First Part" of the report.

During the quarter, copy has been prepared, edited, proof read, and the pamphlet proceedings of the Hanover Sanitary Convention, has been printed.

Proof has been read, and about 240 pages of the annual report for 1896 have been printed. Fifty copies of the bound volumes have been received at this office. A copy has been sent to each member of this Board.

List of Names and Addresses of Health Officers for 1897-98.

A sixteen-page pamphlet [No. 239], "Names and Addresses of Health Officers in Michigan for the Year 1897-98," has been prepared and printed. In the list are the names and addresses of health officers from 1,086 of the 1,217 townships, 252 of the 296 incorporated villages, and 70 of the 76 incorporated cities. Names of townships, cities and villages from which no return has yet been received appear in the proper order in the list, with a blank space for the name and address of the health officer.

Reprinting Diagrams, Leaflets, etc.

In July the two-page leaflet diagram "Isolation and Disinfection Restricted Scarlet Fever and Diphtheria in Michigan during the 8 years, 1887-94" [plate S15], and "Lives Saved from Public Health Work" [plate S25], was printed to the number of 2,000 copies, for distribution.

In July the two-page leaflet diagram "Typhoid Fever, Sewers and Water Supply in Munich [plate 651], and "Low Water in Wells, and Sickness from Typhoid Fever in Michigan, by Months, for a period of 14 years, 1878 and 1880-92" [plate 681], was printed to the number of 2,000 copies, for distribution.

In September the six-page leaflet [No. 229], "The Restriction and Prevention of Whooping-Cough," was slightly revised, and an edition of 10,000 copies printed, to be sent to the family and neighbors of the family in which whooping-cough is present.

Revision of Old and Printing of New Circulars, Leaflets, etc.

The Board's circular, "Treatment of the Drowned," has been revised and printed to the number of 3,600 copies. The revised edition is printed on pages cxii-cxiii of the annual report of this Board for 1897.

The following circular [238], "Notice to Michigan Teachers," was prepared, and 1,000 copies printed; 500 of these copies were printed on card-board for wall purposes, and 500 copies were printed on folio-post paper for use by the teachers.

NOTICE TO MICHIGAN TEACHERS.

FROM THE OFFICE OF THE STATE BOARD OF HEALTH.

The Legislature of 1897 has passed a law making it possible for the State Board of Health to fully comply with Act 146, laws of 1895, which requires "That there shall be taught in every year in every public school in Michigan the principal modes by which each of the dangerous communicable diseases is spread, and the best methods for the restriction and prevention of each such disease. * * * Neglect or refusal on the part of any superintendent or teacher to comply with the provisions of this law shall be considered a sufficient cause for dismissal from the school by the school board."

For lack of funds the State Board of Health was not able to comply with this law as fully as was desired, but it is now prepared to send to every teacher and public-school superintendent in Michigan the "data and statements which shall enable them to comply with this act."

Copies of leaflet No. 226, issued by the State Board of Health in compliance with this law, are sent with this, and to each of the Teachers' Institutes, for gratuitous distribution to teachers. It is hoped that every teacher in attendance will obtain and keep a copy. More complete publications may be had by addressing the Secretary of the State Board of Health, at Lansing.

The State Board of Health desires to place in the hands of every school superintendent and teacher in Michigan such complete data and statements on this subject as shall enable them easily and completely to give "oral and blackboard instruction," as the law requires, on this exceedingly important branch of education.

Very respectfully,

HENRY B. BAKER,

Secretary.

Office of the State Board of Health,
Lansing, Michigan, July 10, 1897.

[Kindly Post This Notice in a Conspicuous Place.]

In September the following circular [No. 240] was prepared and 1,000 copies printed:—

[240.] DATA RELATIVE TO SUMMER RESORTS, ETC.

To the Proprietors of Mineral Springs, Mineral Baths, Table Waters, Sanitaria, Parks, Health Resorts and Pleasure Resorts in Michigan:

Gentlemen—In pursuance of a request of the Michigan Legislature, expressed in a concurrent resolution, and approved by the Governor, the secretary of the State Board of Health desires to collect and place before the State Board of Health, and, if found practicable, to publish the same to place before prospective visitors to

Michigan, information relative to all the places in Michigan where people congregate for health or pleasure.

Whoever receives this circular letter will confer a favor if he will either respond fully or bring it to the notice of some person who will do so.

Have the kindness to send to the secretary of the State Board of Health, Lansing, Michigan, replies to the following questions, also samples of all printed matter and illustrations which you may have for distribution for advertising and other purposes.

By direction of the State Board of Health.

Very respectfully,
HENRY B. BAKER,
Secretary.

Office of the secretary of the State Board of Health, Lansing, September, 1897.

1. Name of your place?
2. In what part of Michigan is your place?
3. In or near what city, or village?
4. On what railroad lines, and steamboat lines, and just how to reach it?
5. Population of the place in winter?
6. Population of the place in summer?
7. Method of disposal of waste and excreta?
8. Source of ordinary water supply?
9. Character of the ordinary water supply?
10. Source of the mineral water or table water found or made at your place?
11. Character of the mineral water or table water?
12. Send latest analysis.
13. Nature of packages of water sold, and prices?
14. Purposes for which the water is most useful?
15. Description of bath houses?
16. Description of sanitarium in the place?
17. Description of club houses in the place?
18. Description of hotels in the place?
19. Method of lighting, sanitarium, club houses, cottages, and streets?
20. Method of locomotion—boats, electric cars, etc.?
21. What public accommodations in sail and row boats?
22. Are guides essential or desirable? If so, what are their prices?
23. Facilities for lake bathing?
24. Nature of the beach?
25. Nature of the fishing, kinds of fish, etc.?
26. Natural scenery of the place and surrounding country? Pine or hemlock forests?
27. Is there clay or loam soil, or is the surface clean sand?
28. Artificial scenery, whether plain or picturesque?
29. Is it in the "fruit belt" in southwestern or western Michigan?
30. What fruits are plentiful and cheap?
31. What vegetables are plentiful and cheap?
32. What fruits and vegetables are raised in your immediate vicinity?
33. Is your resort private, limited to members of a club, or public?
34. What accommodations for visitors—cottages, hotels, dining halls, etc.?
35. Prices in hotels, rent for cottages, furnished and unfurnished?
36. Please give address of any other person or persons to whom this circular can be sent.
37. Signature and P. O. address of person who fills out this blank.
(Name).....
(P. O.).....

Distribution of Annual Report, Leaflets, etc.

About 1,400 copies of the annual report for 1895 have been distributed to health officers of townships, cities and villages, and to sanitarians in this State.

The printed list of names and addresses of health officers in Michigan for 1897-98 has been sent to health officers of townships, cities and villages, to the number of 1,589 copies.

To conductors and officers of Teachers' Institutes, and to teachers, there have

been sent 6,500 copies of leaflet No. 226, 120 copies of circular No. 237, 160 copies of circular [No. 238], "Notice to Teachers," and about 400 copies of [reprint No. 484] Prof. Fall's paper, "A Plea for Teaching Sanitary Science in our Schools."

In response to special requests of teachers and superintendents of schools, there have been sent about 2,500 copies of leaflet No. 226, and about 1,250 sets of publications of this office relating to the modes of spreading and the best methods for the restriction and prevention of the dangerous communicable diseases.

About the usual numbers of pamphlets on the restriction and prevention of the different dangerous diseases were sent to the health officers of localities in which dangerous diseases have been reported. It was at the same time requested of these health officers that the pamphlets be distributed *to the neighbors of the persons sick with such diseases* and to such other persons as they would be likely to benefit. In response to special requests of sanitarians in this and other states, copies of annual reports, proceedings of sanitary conventions, proceedings of meetings of the board, and pamphlets on the restriction and prevention of the dangerous communicable diseases, have been sent where it was thought likely to benefit public health interests.

The usual record of distribution of publications has been kept.

Distribution of New Circulars, etc.

July 30, 1897, a hektograph circular letter (1826) and a copy of the "Concurrent Resolutions" relative to the proposed Quarter-Centennial Celebration of the establishment of this Board, were sent to each of 147 officers and members of state and provincial boards of health.

August 7, hektograph letter (1828), hektograph abstract of meeting of the Board July 29-30, and printed circular [237], "Treatment of Drowned, etc.," were sent to 50 daily and 71 weekly newspapers in Michigan. To each of 27 captains of life-saving stations in Michigan, there were sent a hektograph circular letter (1834), 15 copies of the printed circular [237] "Treatment of Drowned," and a return postal-card; 14 of the 27 captains gratefully acknowledged the receipt of the publications from this office.

September 14 a blank [240] "Data Relative to Summer Resorts, etc.," copy of circular [No. 237], and copy of "Concurrent Resolution" were sent to 350 proprietors of summer resorts, mineral springs, hotels, and to 150 daily and weekly newspapers in Michigan. On the same day hektograph circular letter (1843), circulars Nos. 240 and 237, and "Concurrent Resolutions" were sent to 83 general passenger agents of railways and owners and agents of steamers and steamboat lines in Michigan.

September 17 and September 27, circulars 237 and 240 and "Concurrent Resolutions," were sent to 138 keepers of hotels, baths, mineral springs and summer resorts, and to 28 presidents and secretaries of summer resort associations.

It will be seen, by the foregoing, that 854 copies of blank [240] "Data and Statements Relative to Summer Resorts," have been sent out from this office. Out of this number, 87 replies have been received. In nearly every instance the blank seems to have been given careful attention, and considerable interest has been shown in answering the questions. I have been interested in noticing the great numbers of summer resorters, shown by the difference between the winter and the summer population at those resorts from which statements have been received.

It is probable that nearly all the blanks sent out reached their destination, as only 9 or 10 envelopes have been returned unclaimed, with statements by postmasters "Refused," "Returned to writer," "No summer resort hotel here," etc.

Accessions to the Library Card-Cataloguing, etc.

Some 275 numbers of journals (weeklies, monthlies and quarterlies) and 127 books and pamphlets, have been received (mostly in exchange for our publications) and entered in the library accession books.

Some work has been done on the card-catalogue of the library.

The usual work in connection with the financial accounts of the office has been done.

National Conference of State Boards of Health, Nashville, August, 1897.

By virtue of their appointment by the Board as delegates, your president and secretary attended the meeting of the National Conference of State Boards of Health, at Nashville, August 18-19, 1897. I presume the president has his report in writing; my report is presented herewith. [The secretary's report is printed on following pages of this report.]

Distribution of Publications.

1. A limited number of copies of each publication should be saved for future distribution, but in most cases, pamphlets, reprints, etc., are most valuable at the time they are published, and should be distributed at that time. In recent years the numerous other lines of work have taken attention away from this important work. There ought to be a clerk whose especial duty it should be to keep watch of the receipt and distribution of the new publications.

2. The office is crowded with leaflets, pamphlets, reports, etc., which if sent out to the right persons, at the right time, would be interesting and valuable.

3. No invoice has recently been taken of leaflets, reprints, etc., on hand at the end of the fiscal year. Such an invoice would take some time to make, but it seems to be desirable that it should be made immediately.

4. There are in Michigan 76 cities and 257 villages. Each city and village probably has a public or school library. Would it not be well to plan a circular to go to each school library offering to send what publications this office can spare that would be of use and interest to the library? Would such expense properly come out of the school fund?

Relative to the Clerks in the Office.

Two hard-working clerks in the office have temporarily left; Doctor Cattermole has gone to Europe, and Mr. McHenry has gone back to the University. The office is left short of help, with no decrease in the regular work, and with new lines of work in view and in progress.

The work in connection with the school law has taken and will take the time of nearly one clerk: the compilation and publication of the "Public Health Laws in Force in Michigan in 1897" ought to occupy the time of one clerk for a considerable time; extra work has been and will continue to be occasioned by the proposed quarter-centennial celebration of the establishment of the State Board of Health.

For several months past some of the regular work of the office has been pushed aside, because of the new lines of effort just mentioned; and unless the clerical force is kept up to at least what it has been, the regular work of the office—publication of annual reports, etc., will fall behind. If new clerks are employed, they can be temporary, and can be impressed with the idea that they have no certainty of permanent employment. For the best interests of the State, the clerical force should be kept up to what it has been until after the quarter-centennial celebration.

Detroit Sanitary Convention.

The special committee appointed by the Board to make arrangements for a sanitary convention to be held in Detroit under the auspices of this Board, met in Detroit on the evening of September 17, and conferred with some thirty citizens of Detroit. Officers were elected, and committees were appointed. Arrangements are being made as rapidly as practicable, and it now seems that the convention will probably be held early in December, 1897, perhaps December 9 and 10.

Immigrants Exposed to Contagious Diseases and Destined to Settle in Michigan.

During the third quarter of 1897, immigrant notices were received as under:

July 7, a notice was received from Dr. J. H. Senner, U. S. Commissioner of Immigrants at New York City, that measles had occurred on board the S. S. Elysia, which arrived at that port on July 6, and that one of the passengers was destined for Brighton, Mich.

On July 14, a notice was received from the surgeon of the S. S. Numidian, that a case of chicken-pox had been landed at the Dominion Quarantine, Grosse Isle, P. Q., and that passengers were on board destined for Detroit, Gladstone, Hancock, and Sault Ste. Marie, Mich.

On August 3, a notice was received from the surgeon of the S. S. State of California, that two cases of measles had been landed at the Dominion Quarantine, Grosse Isle, P. Q., and that passengers were on board destined for Champion township and Cadillac, Mich.

On September 8, a notice was received from the surgeon of the S. S. State of California, that a case of Diphtheria had been landed at the Dominion Quarantine, Grosse Isle, P. Q., and that passengers were on board destined for Detroit, Manistique, Negaunee and Grand Rapids, Mich.

Copies of the above-mentioned notices were sent to the health officers of the several places of destination.

Hektograph Work.

Hektograph work to the amount of about 4,045 pages has been prepared, including 1,140 pages of weekly and monthly bulletins, "Health in Michigan," 860 pages of manuscript of book for teachers, by Prof. Delos Fall, M. S.; 471 pages, proceedings of the regular meeting of the State Board of Health, July 30-31; 200 pages, "Impostors—Not representatives of the State Board of Health;" 120 pages, report of the examination of the plans for proposed new buildings at the Michigan School for Deaf at Flint; 110 pages, "Public Health Work in Michigan," and 101 pages, circular letter to the General Passenger Agents of Railroad and Steamboat Lines in Michigan, relative to Summer Resorts, etc.

Work in Connection with Sickness Statistics.

During the third quarter of 1897, 1,501 blank report, receipt and return postal cards, 111 record books, 18 written letters, and 95 hektographed and 14 printed circular letters, relative to weekly card reports, have been mailed to 140 health officers and regular correspondents; 1,124 weekly card reports have been received and entered on the register; 53 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 110 copies of the hektographed monthly bulletin, "Health in Michigan," were mailed each month. These bulletins have been consolidated for this quarterly report. Considerable work has also been done on the compilation of the weekly card reports of sickness during the year 1896, for the annual report for 1897.

Health in Michigan in the Third Quarter of 1897—Communicable Diseases.

Compared with the preceding quarter (April, May and June), reports from all sources show scarlet fever to have decreased by an average of ten places per month; diphtheria to have decreased by an average of seven places per month; measles to have decreased by an average of one hundred and three places per month; typhoid fever to have increased by an average of thirty-nine places per month; small-pox to have decreased by an average of 0.7 place per month; whooping-cough to have increased by an average of eight places per month; and consumption to have increased by an average of thirteen places per month, in the third quarter of 1897.

Meteorology at One Central Station, and Sickness Throughout Michigan from all Causes, Third Quarter of 1897, Compared with the Preceding Quarter.

A comparison of meteorological conditions at Lansing, of the third quarter of 1897, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been the same (northwest), the velocity 2.9 miles per hour less, the temperature 13.05 degrees higher, the rainfall .34 of an inch more, the absolute and relative humidity more, the day and night ozone less, and the depth of water in the observation well 1 inch more in the third quarter of 1897.

Compared with the preceding quarter (April, May and June), the reports from regular observers show a marked increase of cholera infantum, cholera morbus,

dysentery, diarrhea, remittent fever, inflammation of bowels and intermittent fever, and a marked decrease of influenza, pleuritis and bronchitis in the third quarter of 1897.

The Weather and the Health in Michigan in the Third Quarter of 1897, Compared with the Average for the Corresponding Quarters in the Eleven Years, 1886-1896.

A comparison of the meteorological conditions at Lansing of the third quarter of 1897, with the average for the third quarters in the eleven years, 1886-1896, shows that in 1897 the prevailing direction of the wind was northwest (instead of southwest), the velocity was .7 of a mile per hour less, the temperature was 1.40 degrees higher, the rainfall was .73 of an inch more, the absolute humidity was more, the relative humidity was the same, the day and night ozone less, and the depth of water in the observation well 3 inches less.

Compared with the average in the corresponding quarters in the eleven years, 1886-1896, the reports from regular observers indicate that pleuritis was more prevalent, and typhoid fever, intermittent fever, remittent fever, whooping-cough, consumption, dysentery, cholera morbus, and cholera infantum were less prevalent in the third quarter of 1897.

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND OF THE CONDITION OF HEALTH GENERALLY IN MICHIGAN DURING THE QUARTER ENDING DECEMBER 31, 1897.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: For diphtheria, 175; for scarlet fever, 115; for typhoid and typho-malarial fever, 244; for measles, 69; for whooping-cough, 37; for consumption, 252; and for small-pox, 1. Total for the seven diseases, 893.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 3,018.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards or in the form of the circular letter, were sent out during the quarter to the number of 2,311.

The "final" reports of outbreaks received and filed during the quarter were: For diphtheria, 105; for scarlet fever, 69; for typhoid and typho-malarial fever, 168; for measles, 42; for whooping-cough, 22; for consumption, 92; and for small-pox, 1. Total for the seven diseases, 499.

The large increase during this quarter, over the preceding quarter, of the number of reports of outbreaks of dangerous communicable diseases acted upon, is due to the information received from the Monthly Bulletin of Vital Statistics issued by the State Department, which has resulted in giving this office the first information of the occurrence of 21 deaths from diphtheria, 59 deaths from typhoid and typho-malarial fever, 13 deaths from whooping-cough, 1 death from measles and 220 deaths from consumption. This has also caused an increase in the number of communications received and filed and also in the number of other communications sent out from this office.

During the quarter, the local columns of 1,834 newspapers have been looked over for reports of occurrences of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 9 outbreaks of diphtheria, 3 outbreaks of scarlet fever, 23 outbreaks of typhoid and typho-malarial fever, 3 outbreaks of measles, 1 outbreak of small-pox and five cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE 1.—FOURTH QUARTER OF 1897.—*Exhibiting the number of outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-Cough, Consumption and Small-pox, from October 1 to December 31, 1897, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, Oct. 1, to Dec. 31, 1897.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria	175	5	11	33	56
Scarlet Fever..	115	3	33	67	0
Typhoid Fever..	244	9	31	39	30
Measles.....	69	4	0	67	33
Whooping-Cough	37	0	0	0	0
Consumption....	245	2	40	20	40
Small-pox.....	1	100	100	0	0
Average for the seven diseases.		5	27	39	34

Small-pox in Michigan in the Fourth Quarter of 1897.

One outbreak of small-pox was reported during the quarter, at Bay City. Notwithstanding the fact that the disease was not recognized or reported to the local health authorities until about one week after the first case was taken sick, and although a large number were thereby exposed, yet the disease was so restricted that only four cases occurred, and all were in the family in which the first case occurred. No death occurred.

Summary Relative to the Year 1897.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the year 1897, are as follows: For diphtheria, 543; for scarlet fever, 336; for typhoid and typho-malarial fever, 508; for measles, 642; for whooping-cough, 142; for consumption, 481; and for small-pox, 2. Total for the seven diseases, 2,654.

The number of communications relative to dangerous communicable diseases, received and placed on file during the year, was 11,339.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the year to the number of 8,451.

The "final" reports of outbreaks received and filed during the year 1897, were: For diphtheria, 414; for scarlet fever, 301; for typhoid and typho-malarial fever, 332; for measles, 480; for whooping-cough, 94; for consumption, 207; and for small-pox, 2. Total for the seven diseases, 1,830.

During the year, 1897, the local columns of 6,801 newspapers have been looked over for reports of the occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 20 outbreaks of diphtheria, 9 outbreaks of scarlet fever, 53 out-

breaks of typhoid and typho-malarial fever, 46 outbreaks of measles, 5 outbreaks of whooping-cough, 1 outbreak of small-pox and 32 cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE 1.—YEAR 1897.—*Exhibiting the number of outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-Cough, Consumption and Small-pox, from January 1 to December 31, 1897, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, Jan. 1 to Dec. 31, 1897.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notice sent from this office.
Diphtheria.....	*543	4	25	40	35
Scarlet fever....	*336	3	33	45	22
Typhoid fever...	*508	11	27	40	40
Measles.....	*642	7	37	22	41
Whoop'g Cough.	*142	3	20	40	40
Consumption....	*471	7	40	16	44
Small-pox.....	*2	50	100	0	0
Average for the seven diseases.	-----	6	33	30	37

* The numbers of outbreaks given in this table do not necessarily agree with the numbers given in tables in another part of the Annual Report, for the reason that all alleged outbreaks, of which information was obtained from the newspapers and other sources, are included in this table. If the health officers denied that such outbreaks occurred, or if they made no response to the letters sent out from this office, relative to newspaper reports, such alleged outbreaks are not included in the compilation of that disease.

For the purpose of facilitating the proper action for the restriction of every "disease dangerous to the public health" and to make it possible to compile the important "contagious disease statistics," a record is kept of facts concerning every outbreak of a "disease dangerous to the public health," upon which action is taken by this office, and also of every important communication relating thereto received or sent out. This required over 19,790 entries to be made in the "Record Books," one of which books is kept for each dangerous communicable disease.

During the year 1897, compared with the year 1896, action was taken on outbreaks of dangerous communicable diseases as follows: On diphtheria, 124 outbreaks more; on scarlet fever, 49 outbreaks less; on typhoid and typho-malarial fever, 55 outbreaks less; on measles, 332 outbreaks more; on whooping-cough, 76 outbreaks less; on small-pox, 6 outbreaks less; and on consumption, 155 outbreaks more, than in 1896. In all, 425 outbreaks more were acted upon in 1897 than in 1896, and 66 outbreaks more in 1896 than in 1895.

Small-Pox in Michigan During the Year 1897.

Only two outbreaks of small-pox were reported during the year. The first outbreak occurred in April, in Blissfield township, Lenawee Co., and there being a dispute as to the diagnosis of the disease, Dr. George H. Cattermole was sent as a representative of this Board to investigate. His report shows that while he had some doubt as to its being genuine small-pox yet he advised that the benefit of the

doubt be given to the public safety, and that the same precautions be taken as in cases recognized as genuine cases of small-pox. On May 28 a final report was received from the health officer stating there had been eleven cases and no deaths and that the disease was restricted to the one house in which the first case occurred.

The other outbreak occurred in October, at Bay City, and on November 24 a final report was received stating that four cases had occurred, with no deaths, and that in this outbreak the disease was also restricted to the one house in which the first case occurred. Making a total of fifteen cases, with no deaths, during the year 1897.

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the director of the Michigan Weather Service, Lansing, for his use; it is sent by him to the chief of the U. S. Weather Bureau at Washington, D. C.

Ozone test-paper, sufficient to last three months, was sent to each of ten meteorological observers for this office.

The article "Meteorology in Michigan in 1896" is completed and ready for the printer, and some compiling has been done on the monthly registers for 1897.

Diagrams and maps were made to illustrate articles in the Annual Report as follows:

Map—Distribution of Diphtheria in Michigan, 10 years, 1886-95.

Map—Distribution of Measles in Michigan, 7 years, 1889-95.

Map—Distribution of Typhoid Fever in Michigan, 7 years, 1889-95.

Map—Distribution of Scarlet Fever in Michigan, 10 years, 1886-95.

Diagram 1—Exhibiting the average annual number of cases of sickness and deaths per 10,000 average annual population, which were reported as having occurred in Michigan, from the different dangerous communicable diseases, during specified period of years.

Fifteen diagrams illustrating meteorological conditions in Michigan in 1896, as follows:—Average Temperature, Average Daily Range of Temperature, Absolute and Relative Humidity, Fogs, Per Cent of Cloudiness, Rainfall, Day and Night Ozone, Velocity of the Wind, Wind Direction, and Atmospheric Pressure.

Some 400 sheets of book paper, size 27 by 7½ inches, were sent to Prof. J. H. Long, Chicago, and prepared according to Schönbein's formula, for atmospheric ozone testing.

Meteorological blank registers, stamped envelopes, and postal cards, sufficient to last during the year 1897, were sent to 16 meteorological observers for this office.

Reprinting of Leaflets, Diagrams, etc.

In October the two-page leaflet No. 227 (Fifth Edition) was reprinted to the number of 1,000 copies for distribution.

The slip No. 224 (7th Ed.) relative to consumption, was reprinted to the number of 10,000 copies for general distribution.

The two-page leaflet diagram with plate 815 "Isolation and Disinfection Restricted Diphtheria and Scarlet Fever in Michigan during the 8 years, 1887-94," on one side and plate 825 "Lives Saved by Public Health Work," since the Board undertook to restrict scarlet fever, small-pox and typhoid fever, was reprinted to the number of 2,000 copies.

The six-page leaflet No. 176 (7th Ed.) "Restriction and Prevention of Measles," was reprinted to the number of 10,000 copies, for distribution to localities where the disease exists.

Annual Meeting State Teachers' Association, Lansing, Dec. 27-30, 1897.

The Annual Meeting of the State Teachers' Association was held at Lansing, December 27-30, 1897, and the meeting was unusual for several reasons:

One feature of the association which aided in making the meeting a success was the fact that one of our members—Prof. Delos Fall—was the president of the Association.

On the evening of December 29, the State officers held a reception, the capitol was thrown wide open, and each office had its own reception committee. The occasion was a rare opportunity for the teachers of Michigan to study the various working places of the different State officials. In the office of the State Board of Health, several lines of work were being carried on, diagramatic charts were exhibited, and some of the work of the office was briefly explained. One map of the State, prepared as a diagram, showing the localities where each of the various dangerous communicable diseases was then reported, was of special interest.

Printing of New Leaflets, etc.

During this quarter no new leaflets, pamphlets, etc., were printed.

Compiling, Editing Proof-Reading, etc.

The compilation of reports from all sources relative to typhoid fever in Michigan in 1896 has been completed and the compilation proved. The compilation of reports relative to measles in Michigan in 1896 is nearly completed.

The preparation of the articles "Diphtheria in Michigan in 1896," and "Scarlet Fever in Michigan in 1896" have been finished and are nearly ready for the printer. The article on "Typhoid Fever in Michigan in 1896" has been commenced. Relative to the year 1896, short articles on the following subjects have been prepared: Rabies, Cheese Poisoning, Milk Sickness, Mumps, Diseased Cows, Suspected Poisoning by Pressed Beef, Chicken-pox, Sickness alleged to have been caused by Peach Yellows, violation of Public Health-Laws, etc.

Some work has been done in connection with the copy for "Part I" of the annual report of this Board for 1897, and some work has been done in the preparation of the copy for the printed proceedings of the Sanitary Convention held at Detroit.

Accessions to the Library. Card-Cataloguing, etc.

Some 275 numbers of journals (weeklies, monthlies and quarterlies) and 145 books and pamphlets have been received (mostly in exchange for our publications) and entered in the library accession books.

Some work has been done on the card-catalogue of the library.

The usual work in connection with the financial accounts of the office has been done.

Detroit Sanitary Convention, Dec. 9 and 10, 1898.

The Board held one of its sanitary conventions in Detroit, December 9 and 10. The convention was a success, especially so far as the papers presented were concerned, they being of extreme value to public health work.

Sanitary Convention at Tawas City, Jan. 20 and 21, 1898.

In accordance with action by the Board, the Secretary went to Tawas City and met with the local committee that had been appointed by citizens of that city and made arrangements for a sanitary convention to be held under the auspices of the State Board of Health. One thousand copies of the preliminary announcement were printed and distributed. The program will be ready for distribution about January 13.

Special Investigations.

The last of November scarlet fever broke out at Hartland, Livingston County. There being dispute concerning the diagnosis, Doctor Ranney of Lansing was sent as the State Board of Health Inspector. He diagnosed scarlet fever, and his report will be found printed in "Scarlet Fever in Michigan in 1897."

Immigrants Exposed to Contagious Diseases, and Destined to Settle in Michigan.

During the fourth quarter of 1897, immigrant notices were received as follows:—November 4, a notice was received from the surgeon of the S. S. State of Cali-

fornia, that a case of measles had been landed at the Dominion Quarantine, Grosse Isle, P. Q., and that one of the passengers was destined for Ironwood, Mich.

On December 20, a notice was received from Thomas Fitchie, U. S. Commissioner of Immigrants at New York City, that small-pox had occurred on board the S. S. Edam, and that one of the passengers was destined for Huron, Mich.

On December 29, a notice was received from Thomas Fitchie, U. S. Commissioner of Immigrants at New York City, that measles had occurred on board the S. S. Westernland, and that one of the passengers was destined for Northport, Mich.

Copies of the above-mentioned notices were sent to the health officers of the several places of destination.

Hektograph Work.

Hektograph work to the amount of about 2,583 pages has been prepared, including 1,026 pages of weekly and monthly bulletins, "Health in Michigan;" 68 pages, proceedings of the regular meeting of the State Board of Health, October 8, 1897; 180 pages, "In every case of a disease dangerous to the public health, public notice must be given;" and 120 pages, circular letter to registered cheese makers in Michigan, relative to sending samples of cheese to Prof. Vaughan, etc.

Annual Reports from Health Officers for the Year 1897.

Work has been done to prepare for securing the annual reports from health officers. Two blanks and a circular letter have been made ready, and envelopes to the number of 1,584 have been addressed to health officers of townships, cities and villages in Michigan. Each envelope contained one circular No. 218, one copy of blank "I," and one blank form of "Copy of Record" of diseases dangerous to the public health in 1897. Each envelope contained an envelope addressed to this office. These supplies were sent out the last days of December.

Distribution of Annual Reports, Leaflets, etc.

About 1,500 copies of the annual report of this Board for 1895 have been distributed to: Sanitary Journal Exchanges, Secretaries of State Boards of Health, Secretaries of State Medical Societies, Meteorological Observers, Exchanges, Members of Boards of Corrections and Charities, Libraries, Correspondents, Presidents of Villages and Cities, Clerks of Villages and Cities, and Health Officers and Sanitariums of this and other states.

About 1,000 copies of the annual report of this Board for 1896 have been distributed to places, persons, etc., similar to those above mentioned.

The printed proceedings of the Hanover Sanitary Convention have been distributed to: Sanitary Journal Exchanges, Secretaries of State Medical Societies, Meteorological Observers, Exchanges, Members of State Boards of Corrections and Charities, Libraries, Correspondents, Health Officers of Cities, to all who took part in the Convention, and to others who made requests to receive a copy.

About 744 copies of the "President's Address" [Reprint No. 491] were sent to the Presidents of Cities and Villages, Clerks of Cities and Villages.

At the Detroit Sanitary Convention there were distributed: 220 copies of leaflets 106, 175 copies of No. 110, 133 copies of No. 124, 250 copies of No. 175, 140 copies of the slip No. 224, 160 copies of the leaflet No. 226, and 280 copies of the two-page leaflet diagram (plates 815 and 825).

Prof. Harriet A. Marsh of the Hancock School of Detroit distributed at the Hancock Mothers' Meeting 150 copies of each of leaflet No. 226, reprints No. 466 and 507, and diagrams (plates 815, 825, 651 and 681).

About 1,400 copies of the announcement and 2,000 of the program for the Detroit Sanitary Convention were distributed to those whom it was thought would be interested in the meeting, such as Health Officers of Townships, Cities and Villages, Editors of Newspapers, and Sanitariums in this State. About 1,000 copies of the announcement for the Tawas City Sanitary Convention were distributed to health officers, editors of newspapers, and sanitariums and others in this State.

To Teachers' Institutes, County School Superintendents, Teachers and others, there have been sent out: About 4,000 copies of leaflet No. 226, 100 copies of leaflet No. 227, about 200 copies of reprint No. 484 and circular No. 237, 50 copies of circular 238, and about 700 school sets of publications of this office relating to teaching in

the schools the modes of spreading and the best methods for the restriction and prevention of the dangerous communicable diseases.

About the usual number of pamphlets on the restriction and prevention of the different dangerous diseases were sent to the health officers of localities in which dangerous diseases have been reported. It was at the same time requested of these health officers that the pamphlets be distributed *to the neighbors of the persons sick with such diseases* and to such other persons as they would be likely to benefit. In response to special requests of sanitarians in this and other States, copies of annual reports, proceedings of sanitary conventions, proceedings of meetings of the Board, and pamphlets on the restriction and prevention of the dangerous communicable diseases, have been sent where it was thought likely to benefit public health interests.

Work in Connection with Sickness Statistics.

During the fourth quarter of 1897, 1,323 blank report and receipt cards, 97 record books, 9 printed and 4 hektographed circular letters regarding weekly card-reports have been mailed to 116 health officers and regular correspondents; 1,072 weekly card-reports have been received and entered on the register; 54 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 108 copies of the hektographed monthly bulletin, "Health in Michigan," were mailed each month. These bulletins have been consolidated for this quarterly report. Considerable work has been done on the compilation of the weekly card-reports of sickness during the year 1896, for the annual report for 1897.

Health in Michigan in the Fourth Quarter of 1897.—Communicable Diseases.

Compared with the preceding quarter (July, August and September), reports from all sources show typhoid fever to have increased by an average of thirty-six places per month, measles to have decreased by an average of eighteen places per month, scarlet fever to have increased by an average of twenty-nine places per month, whooping-cough to have decreased by an average of eight places per month, diphtheria to have increased by an average of twenty places per month, small-pox to have increased by an average of one place per month, and consumption to have decreased by an average of sixteen places per month, in the fourth quarter of 1897.

Meteorology at One Central Station, and Sickness Throughout Michigan, from all Causes Fourth Quarter of 1897, Compared with the Preceding Quarter.

A comparison of meteorological conditions at Lansing, of the fourth quarter of 1897, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been southerly (instead of northwest), the velocity 3.2 miles per hour greater, the temperature 28.75 degrees lower, the absolute humidity much less, the relative humidity more, the day and night ozone less, the rainfall .98 of an inch less, and the depth of water in the observation well 7 inches less.

Compared with the preceding quarter (July, August and September), the reports from regular observers show a marked increase of pneumonia, influenza, pleuritis, tonsillitis, bronchitis and erysipelas and a marked decrease of consumption, diarrhea and dysentery in the fourth quarter of 1897.

The Weather and Health in Michigan in the Fourth Quarter of 1897. Compared with the Average for the Corresponding Quarters in the Eleven Years, 1886-1896.

A comparison of the meteorological conditions at Lansing of the fourth quarter of 1897, with the average for the fourth quarters in the eleven years, 1886-1896, shows that in 1897, the prevailing direction of the wind was southerly,—S. E., S., S. W.—(instead of southwest), the velocity was .3 of a mile per hour less, the temperature was 1.74 degrees higher, the rainfall was .10 of an inch more, the absolute humidity was more, the relative humidity was less, the day and night ozone were less, and the depth of water in the observation well was 5 inches less.

Compared with the average in the corresponding quarters in the eleven years, 1886-1896, the reports from regular observers indicate that dysentery was more than usually prevalent, and consumption, intermittent fever and pneumonia were less than usually prevalent in the fourth quarter of 1897.

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND OF THE CONDITION OF HEALTH GENERALLY IN MICHIGAN DURING THE QUARTER ENDING MARCH 31, 1898.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: For diphtheria, 160; for scarlet fever, 116; for typhoid and typho-malarial fever, 140; for measles, 156; for whooping-cough, 57; for consumption, 504; and for small-pox, 2. Total for the seven diseases, 1,135.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 3,913.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the quarter to the number of 3,820.

The final reports of outbreaks received and filed during the quarter were: For diphtheria, 161; for scarlet fever, 118; for typhoid and typho-malarial fever, 113; for measles, 87; for whooping-cough, 35; and for consumption, 497. Total for the six diseases, 1,011.

The Monthly Bulletin of Vital Statistics issued by the State Department still continues to be of great assistance in the work for the restriction and prevention of the dangerous communicable diseases. During the quarter it has resulted in giving this office the first information of the occurrence of 43 deaths from diphtheria, 7 deaths from scarlet fever, 41 deaths from typhoid and typho-malarial fever, 10 deaths from measles, 11 deaths from whooping-cough and 350 deaths from consumption. This has also caused an increase in the number of communications received and filed and also in the number of other communications sent out from this office, relating to the restriction of diseases.

During the quarter, the local columns of 1,437 newspapers have been looked over for reports of occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of two outbreaks of diphtheria, 1 outbreak of scarlet fever, 9 outbreaks of typhoid and typho-malarial fever, 9 outbreaks of measles, 3 outbreaks of whooping-cough and 6 cases of consumption.* To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

*Consumption seems to be more generally reported by local health officers than it was formerly.

TABLE 1.—FIRST QUARTER OF 1898.—*Exhibiting the number of Outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-Cough, Consumption and Small-pox, from January 1 to March 31, 1898, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officers; the per cent of reports which were denied by the health officers; and the per cent relative to which no reply was received from the health officers.*

Diseases.	Reports from all sources, Jan. 1 to Mar. 31, 1898.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officers.	Per cent of newspaper reports which were denied by the health officers.	Per cent of newspaper reports to which the health officers made no reply to notice sent from the office.
Diphtheria.....	160	1	50	50	0
Scarlet Fever..	116	1	100	0	0
Typhoid Fever..	140	6	22	67	11
Measles.....	156	6	45	22	33
Whooping-Cough	57	5	33	0	67
Consumption....	504	1	67	0	33
Small-pox.....	2	0	0	0	0
Average for the seven diseases.		3	43	31	27

Small-pox in Michigan in the First Quarter of 1898.

Two outbreaks of small-pox were reported during the quarter—one at Royal Oak, and the other at Ionia. In the outbreak at Royal Oak only one case occurred, and it has been reported as recovered; but the final report has not yet been received at this office. The alleged outbreak at Ionia, which occurred during the last week in March, still continues.

Work on Meteorology.

The regular tri-daily observations have been continued at this station, and a summary for each week and for each month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the director of the Michigan Weather Service, Lansing, for his use; it is then sent by him to the chief of the U. S. Weather Bureau, at Washington, D. C.

Ozone test-paper, sufficient to last three months, was sent to each of 11 meteorological observers for this office.

Diagrams and maps were made to illustrate articles in the annual report of this Board for 1897, as follows:—

1. Diphtheria in St. Clair Co. in 1896.
2. Diphtheria in Wayne Co. in 1896.
3. Diphtheria in Huron Co. in 1896.
4. Isolation and Disinfection Restricted Diphtheria in 1896.
5. Pathogenic Micro-organisms "Germs" of Disease.
6. Isolation and Disinfection Restricted Scarlet Fever and Diphtheria in Michigan during the ten years, 1887-96.
7. Location of Sewers and Manholes for Cottage, etc., U. P. Asylum for the Insane, Newberry, Michigan.
8. Isolation and Disinfection Restricted Scarlet Fever in Michigan in 1896.

9. Exhibiting reported Deaths from Scarlet Fever by Age and Sex, per 10,000 population in Michigan, 4 years, 1893-96.

10. Isolation and Disinfection Restricted Measles in Michigan in 1896.

11. Isolation and Disinfection Restricted Typhoid Fever in Michigan, 7 years, 1890-96.

12. Map—Movements of Contagium of Diphtheria in Michigan in 1896.

13. Map—Movements of Contagium of Scarlet Fever in Michigan in 1896.

14. Map—Distribution of Diphtheria in Michigan in 1896.

15. Map—Distribution of Scarlet Fever in Michigan in 1896.

Five diagrams to illustrate the article, "Sickness Statistics in Michigan in 1896."

Accessions to the Library, Card-Cataloguing, etc.

Some 300 numbers of journals (weeklies, monthlies and quarterlies) and about 170 books and pamphlets have been received (mostly in exchange for our publications) and entered in the library accession book.

Some work has been done on the card-catalogue of the library.

The usual work in connection with the accounts of the office has been done.

Reprinting of Leaflets, Pamphlets, etc.

In January, the two-page leaflet diagram, with plate 878, "Isolation and Disinfection Restricted Scarlet Fever in Michigan in 1895," on one side, and plate 823, "Isolation and Disinfection Restricted Scarlet Fever in Michigan in 1894," on the other side, was reprinted to the number of 2,000 copies.

The two-page leaflet diagram with plate, 652, "Pathogenic Micro-organisms 'Germs' of Diseases" on one side, and plate 649, "Deaths in Michigan, 10 years. 1884-93," on the other side, was reprinted to the number of 2,000 copies.

Plate 651, "Typhoid Fever and Sewers in Munich," and plate 681, "Low Water in Wells and Sickness from Typhoid Fever in Michigan, by months, for a period of 14 years. 1878 and 1880-92," were reprinted in the form of a two-page leaflet to the number of 2,000 copies.

A two-page leaflet diagram with "Chart I" (plate 645) on one side, and "Chart II" (plate 644) on the other side, was reprinted to the number of 2,000 copies.

The "Quarterly Bulletin" (No. 1) of the State Board of Health was issued in January, and printed to the number of 3,000 copies for distribution.

In January, 10,000 copies of the leaflet No. 110, "Restriction and Prevention of Scarlet Fever," were printed for distribution.

The four-page leaflet No. 226, "Data and Statements" relative to Dangerous Communicable Diseases was reprinted to the number of 10,000 copies.

The eight-page leaflet No. 106, "Restriction and Prevention of Diphtheria," was reprinted to the number of 10,000 copies.

The revised circular No. 240. "Data Relative to Summer Resorts, etc.," was printed to the number of 500 copies.

Two thousand copies of the leaflet No. 227 were printed.

Ten thousand copies of the four-page leaflet No. 124, "The Prevention of Typhoid Fever," were reprinted.

New Leaflets, Diagrams, etc.

Plate No. 921, "Pathogenic Micro-organisms 'Germs' of Diseases," was made during the quarter, and together with plate 649, "Deaths in Michigan, 10 years. 1884-93," was printed to the number of 18,000 copies for use in sending out with the proposed "Teachers' Sanitary Bulletins."

Tawas City Sanitary Convention, January 20-21, 1898.

The Board held one of its Sanitary Conventions at Tawas City, January 20-21. The convention was a success, both as relates to the papers presented, and to the number of people in attendance.

Hektograph Work.

Hektograph work to the amount of about 4,882 pages has been prepared, including 1,014 pages of weekly and monthly bulletins "Health in Michigan;" 406 pages of abstract of the regular meeting of the State Board of Health, January 14, 1898; 300 pages of abstract of a special meeting of the Board, February 25 and 26, 1898; 230 pages, notice of the Quarter-Centennial Celebration of the Establishment of the Michigan State Board of Health to be held in Detroit, August 9, 1898, etc.

Compiling, Editing, Proof-Reading, etc.

The compilation of reports from all sources relative to "Measles in Michigan in 1896," has been completed and the compilation proved. The compilations relative to small-pox and relative to whooping-cough in Michigan in 1896 have been made and the compilation proved. The compilation of the card reports for the article "Sickness Statistics in Michigan in 1897," has been commenced. The article on "Meteorological Conditions in Michigan in 1896" has been completed and the article on the same subject for the year 1897 has been commenced.

Articles relative to diphtheria and scarlet fever in Michigan in 1896 have been completed and the copy sent to the State printer. Work on the article relative to typhoid fever in Michigan in 1896 has been continued. Work on the article relative to measles in Michigan in 1896 has been continued. Short articles on violation of public-health laws, puerperal fever, glanders, pneumonia, fatality in hogs, soap suspected of being poisonous, etc., have been written. Also the article on R  theln in Michigan in 1896 has been compiled, written and copy sent to the printer. Articles on illuminating oils have been prepared.

Considerable work has been done on the collection and compilation of "Data relative to Michigan as a Summer Resort State."

Work on "Part I" of the annual report for 1897 has been continued.

Forty-six galleys of proof of the pamphlet proceedings of the Detroit Sanitary Convention have been read.

Proof has been read and 128 pages of the annual report of the Board for 1897 have been printed.

Immigrants Possibly Exposed to Diphtheria, Destined to Settle in Michigan.

During the quarter one notice was received, from Thomas Fitchie, U. S. Commissioner of Immigration at New York, containing a list of names and the destination of persons possibly exposed to diphtheria, diphtheria having occurred on board the S. S. La Gascogne. A copy of the notice was sent to the health officers of the two jurisdictions to which the immigrants were destined.

Annual Reports from Health Officers, for the Year 1897.

The first request for the annual report of health officers was sent out December 31, 1897, with necessary blanks for such reports, to each health officer of a township, city or village from which the name of a health officer *had been* received, and to the supervisors of townships, presidents of villages and mayors of cities from which the name of a health officer *had not* been received.

February 16, 1898, the circular letter ("Last Request for Annual Report Required by Law,") was sent to the following delinquents: Health officers of townships, 451; supervisors of townships, 59; health officers of villages, 143; presidents of villages, 19; health officers of cities, 39; and mayors of cities, 1—total, 712.

March 16 there were delinquent in making the annual report: Health officers of townships, 176; health officers of villages, 65; and health officers of cities, 20—total, 261; and, on March 16, the accompanying letter (on next page) was sent to the prosecuting attorney in each of 73 counties with the request that he "advise the health officers to immediately comply with the law." Replies have been received from 52 of the 73 prosecuting attorneys promising to give the subject immediate attention.

At the close of the first quarter of 1898, there were still delinquent in making the annual report, in 63 counties: Health officers of townships, 98; health officers of villages, 37; and health officers of cities, 10—total, 145.

Of the 1,586 local boards of health in Michigan 34 townships, 16 villages and

1 city have failed to return the name of a health officer and no annual report could be obtained from the jurisdictions. Therefore the actual number of jurisdictions delinquent is: Townships, 132; cities, 11; and villages, 53—total, 196.

During the quarter ending March 31, 1898, annual reports for the year 1897 have been received from health officers as follows: Health officers of townships, 1,072; health officers of villages, 252; and health officers of cities, 66—total, 1,390.

[1917-1.]

STATE BOARD OF HEALTH, }
MICHIGAN. }
OFFICE OF THE SECRETARY. }
LANSING, March....1898.

HON.....
Prosecuting Attorney.....County,
Michigan.

DEAR SIR:—The health officers in your county whose names and postoffice addresses appear below have failed to comply with section 1629 Howell's Statutes, which requires an annual report to this office, for the year 1897. Such reports are long past due; and, as this office has twice asked for said annual reports of the health officers, I respectfully request that you advise the health officers to immediately comply with the law.

It is important that the work of this office be not delayed or permanently interfered with by non-compliance with the law on the part of the local health officer. No penalty for violation of this section of law is specified in the Act 81, Laws of 1873; but I respectfully submit that any health officer who fails to comply with that section violates his oath of office wherein he has sworn to perform the duties of his office to the best of his ability.

Trusting that you will give this subject attention, and thanking you in advance,
Very respectfully,

Secretary.

Name of health officer.	Jurisdiction.	Post-office address.
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(The use of the foregoing letter is explained on the preceding page.)

Special Investigation of Typhoid Fever at St. Clair.

Complaint having reached the secretary of the State Board of Health that many cases of fever of doubtful origin were present at St. Clair, Michigan, in which proper precautions were not taken, it being alleged that most if not all the fever was typhoid fever, and there being a dispute between the physicians of St. Clair concerning the exact nature of the sickness, after consulting with the president of this Board and with the Governor, Dr. George E. Ranney of Lansing was sent as an inspector representing the State Board of Health. He reached St. Clair March 7, and made a thorough investigation, collected samples of the drinking water, collected specimens of the blood from those sick, and clinically diagnosed typhoid fever. The samples of water and blood were sent to the State Laboratory of Hygiene, and typhoid fever was there bacteriologically diagnosed. Dr. Ranney's report will be found printed in the article "Typhoid Fever in Michigan in 1898," in the annual report of the Board for 1899. [It is hektograph No. 1921.]

Distribution of Publications.

About 2,900 copies of the "Quarterly Bulletin" No. 1, were sent to: Members and ex-members of this Board, sanitary journal exchanges, meteorological observers and meteorological exchanges, members of State Boards of Corrections and Charities, secretaries of other State Boards of Health, secretaries of State Medical Societies, correspondents in other states, health officers and others in other states,

health officers of cities, villages and townships, mayors and clerks of cities, presidents and clerks of villages, funeral directors and newspapers (about 190) in this State.

The pamphlet proceedings of the Hanover Sanitary Convention has been sent to 282 health officers of villages.

About 506 school sets, 1,650 copies of leaflet No. 226, and 200 copies of leaflet No. 227 have been sent to superintendents and teachers in Michigan.

About the usual numbers of pamphlets on the restriction and prevention of the different dangerous diseases were sent to the health officers of localities in which dangerous diseases have been reported. It was at the same time requested of these health officers that the pamphlets be distributed *to the neighbors of the persons sick with such diseases* and to such other persons as they would be likely to benefit. In response to special requests of sanitarians in this and other states, copies of annual reports, proceedings of sanitary conventions, proceedings of meetings of the Board, and pamphlets on the restriction and prevention of dangerous communicable diseases have been sent where it was thought likely to benefit the public-health interests.

Issue of Blanks for Return of Names and Addresses of Health Officers for 1898-99.

During the quarter 1,961 envelopes were addressed to 1,211 supervisors of townships, 299 presidents of villages, 299 clerks of villages, 76 mayors of cities, 76 clerks of cities. In each envelope was sent a circular letter of instructions, a blank for the return of the name and postoffice address of the health officer for the ensuing year, and a printed return envelope.

List of Clerks and Supervisors of Townships for Ensuing Year.

Blanks have been prepared for use in copying the list of clerks and supervisors to serve in Michigan in 1898-99. The list is copied from a list in the office of the Secretary of State, and is exceedingly useful in this office.

WORK IN CONNECTION WITH SICKNESS STATISTICS.

During the first quarter of 1898, 1,592 blank report, receipt and return postal cards, 113 record books, 41 printed and 239 hektographed circular letters, and 22 typewritten letters, regarding weekly card reports, have been mailed to 301 health officers and regular correspondents; 1,197 weekly card reports have been received and entered on the register; 54 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 104 copies of the hektographed monthly bulletin, "Health in Michigan," were mailed each month. These bulletins have been consolidated for this quarterly report. Considerable work has been done on the compilation of the weekly card reports of sickness during the year 1897, for the annual report for 1898.

Health in Michigan in the First Quarter of 1898—Communicable Diseases.

Compared with the preceding quarter (October, November and December), reports from all sources show diphtheria to have increased by an average of eight places per month, scarlet fever to have increased by an average of four places per month, typhoid fever to have decreased by an average of forty-seven places per month, measles to have increased by an average of forty-three places per month, whooping-cough to have increased by an average of 11 places per month, consumption to have decreased by an average of forty places per month, and small-pox to have been present at one place more in the first quarter of 1898.

Meteorology at One Central Station, and Sickness Throughout Michigan from All Causes. First Quarter of 1898, Compared with the Preceding Quarter.

A comparison of meteorological conditions at Lansing, of the first quarter of 1898, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been northwest (instead of southerly), the velocity

.8 of a mile per hour greater, the temperature 8.96 degrees lower, the rainfall .33 of an inch more, the absolute humidity less, the relative humidity the same, the day and night ozone more, and the depth of water in the observation well 3 inches more, in the first quarter of 1898.

Compared with the preceding quarter (October, November and December), the reports from regular observers show a marked increase of pneumonia, influenza, pleuritis and measles, and a marked decrease of diarrhea and intermittent fever, in the first quarter of 1898.

The Weather and the Health in Michigan in the First Quarter of 1898, Compared with the Average for the Corresponding Quarters in the Twelve Years, 1886-1897.

A comparison of the meteorological conditions at Lansing, of the first quarter of 1898, with the average for the first quarters in the twelve years, 1886-1897, shows that in 1898, the prevailing direction of the wind was northwest (instead of southwest), the velocity was .2 of a mile per hour less, the temperature was 4.63 degrees higher, the rainfall was .76 of an inch more, the absolute humidity was more, the relative humidity and the day and night ozone were less, and the depth of water in the observation well was 4 inches less.

Compared with the average in the corresponding quarters in the twelve years, 1886-1897, the reports from regular observers indicate that remittent fever, consumption, whooping-cough, scarlet fever, intermittent fever, erysipelas and pneumonia were less than usually prevalent in the first quarter of 1898.

SECRETARY'S REPORT OF DANGEROUS COMMUNICABLE DISEASES, OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, AND OF THE CONDITION OF HEALTH GENERALLY IN MICHIGAN DURING THE QUARTER ENDING JUNE 30, 1898.

Dangerous Communicable Diseases.

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and the corresponding number concerning which action was taken by this office, during the quarter, are as follows: For diphtheria, 110; for scarlet fever, 94; for typhoid and typho-malarial fever, 96; for measles, 204; for whooping-cough, 73; and for consumption, 546. Total for the six diseases, 1,123.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 3,433.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards or in the form of the circular letter, were sent out during the quarter to the number of 3,566.

The final reports of outbreaks received and filed during the quarter were: For diphtheria, 89; for scarlet fever, 85; for typhoid and typho-malarial fever, 72; for measles, 153; for whooping-cough, 28; for consumption, 425; and for small-pox, 2. Total for the seven diseases, 854.

The Monthly Bulletin of Vital Statistics issued by the State Department has resulted in giving this office, during the quarter, the first information of the occurrence of 22 deaths from diphtheria, 25 deaths from typhoid fever and typho-malarial fever, 20 deaths from measles, 24 deaths from whooping-cough, and 450 deaths from consumption.

During the quarter, the local columns of 1,497 newspapers have been looked over for reports of occurrence of communicable diseases. (This work is done by the clerk who acts as messenger and janitor, in the intervals of his performance of other duties.) This has resulted in giving this office first information of the alleged occurrence of 5 outbreaks of diphtheria, 3 outbreaks of scarlet fever, 1 outbreak of typhoid fever, 5 outbreaks of measles, 3 outbreaks of whooping-cough, and 4 cases of consumption. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE 1.—SECOND QUARTER OF 1898.—*Exhibiting the number of Outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, Measles, Whooping-Cough, and Consumption, from April 1 to June 30, 1898, of which notice was received at the office of the Michigan State Board of Health: the per cent of reports, first information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

Diseases.	Reports from all sources, April 1 to June 30, 1898.	Per cent of all reports which were obtained from the newspapers.	Per cent of newspaper reports which were confirmed by the health officer.	Per cent of newspaper reports which were denied by the health officer.	Per cent of newspaper reports to which the health officer made no reply to notices sent from this office.
Diphtheria.....	110	5	40	40	20
Scarlet Fever...	94	3	67	0	33
Typhoid Fever...	96	1	100	0	0
Measles.....	204	1	60	20	20
Whooping-cough	73	4	33	3	33
Consumption....	546	1	75	0	25
Small-pox.....	-----	-----	-----	-----	-----
Average for the six diseases.....	-----	2	57	19	24

Small-Pox in Michigan in the Second Quarter of 1898.

No outbreaks of small-pox were reported during the quarter. A final report of the outbreak at Royal Oak, which occurred during the first quarter of 1898, has been received, and shows that only one case occurred which recovered. A final report of the outbreak at Ionia, which occurred during the last week in March, has also been received and shows that two cases of small-pox occurred and three cases of varioloid. No deaths occurred. In this outbreak the disease was also restricted to the one house in which it first occurred.

Work on Meteorology.

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and for each month during the quarter has been made for use in this office in connection with sickness statistics. The monthly summary has been sent, at the end of each month, to the director of the Michigan Weather Service, at Lansing, for his use; it is sent by him to the chief of the U. S. Weather Bureau at Washington, D. C.

Ozone test-paper, sufficient to last three months, was sent to each of 11 observers for this office.

Diagrams and maps were made to illustrate articles in the annual report, as follows:—

1. Movement of Contagium of Measles in Michigan in 1896.
2. Distribution of Measles in Michigan in 1896.
3. Distribution of Typhoid Fever in Michigan in 1896.
4. Distribution of Consumption in Michigan in 1896.
5. Movement of Contagium of Typhoid Fever in Michigan in 1896.
6. Reported Deaths from Measles in Michigan for each of the 29 years, 1868-96.
7. Reported Deaths from Consumption in Michigan for each of the 28 years, 1869-96.
8. Reported Deaths from all Causes; from Specified Diseases and from Specified Communicable Diseases, in Michigan, for each of the 30 years, 1867-96.

9. Lives Saved by Public-Health Work.

10. By Age and Sex the Reported Deaths in Michigan from Diphtheria per 10,000 living, 5 years, 1892-96.

11. By Age and Sex the Reported Deaths in Michigan from Measles per 10,000 persons living, for the 5 years, 1892-96.

12. By Age and Sex, the Reported Deaths from Typhoid Fever in Michigan, per 10,000 population, for the 6 years, 1891-96.

13. Isolation and Disinfection Restrict Measles in Michigan, 7 years. 1890-96.

Teachers' Sanitary Bulletins.

The issuing of a Monthly Teachers' Sanitary Bulletin was commenced, and four numbers issued during the quarter. From the county school commissioners and the superintendents of city schools the name and postoffice address have been secured of nearly every teacher in Michigan, and a copy of each bulletin has been sent to each teacher whose address could be ascertained. There is now being prepared in Michigan a complete alphabetical list of all teachers in Michigan, with a view to having a permanent list that can be amended from time to time as the postoffice address of the teacher changes. Twenty thousand copies of each number of the bulletin have been printed, and nearly all of each issue have been distributed to teachers and others interested in the modes of spreading and the best methods for the restriction of the dangerous communicable diseases.

Compiling, Editing, Proof-Reading, etc.

Compiling of data contained in the reports from all sources relative to "Diphtheria in Michigan in 1897" has been made and the proving of the compilation has been commenced. From the annual reports from health officers in Michigan in 1897, the data contained thereon relative to diphtheria, scarlet, typhoid fever and measles, have been tabulated for use in connection with the communicable-disease statistics. Work in connection with the compilation of meteorological data from the meteorological registers for 1897 has been continued.

Preparation of the articles on typhoid fever and measles in Michigan in 1896 has been completed. Articles on small-pox, chicken-pox, and whooping-cough have been written and prepared for the printer. The work in the preparation of tables and diagrams for the summary for the communicable-disease articles for 1896 has been finished, and the article is nearly ready for the printer. An alphabetical index for the annual report of the Board for 1897 is being prepared.

Proof has been read, and about 200 pages of the annual report for 1897 has been printed. Within a few weeks this report should be ready for distribution.

Return of Names and Postoffice Addresses of Health Officers for 1898-9.

There has been returned to this office the name and postoffice address of 1,454 health officers of townships, cities and villages in Michigan, the return has been placed on file, and each name and address entered on a book for that purpose. To each of 511 of these health officers (who were not health officers last year) has been sent a set of leaflets of this office bearing upon the restriction and prevention of the dangerous diseases, a supply of blank forms for reporting to this office the occurrence of dangerous diseases, and a sample blank for keeping a record of diseases occurring during the ensuing year.

List of Supervisors and Clerks in Michigan During 1898-9.

A list of the supervisors and clerks of townships to serve in Michigan during the ensuing year has been made from the returns made to the office of the Secretary of State, for use in this office.

Distribution of Publications, etc.

In response to special requests of teachers and others, 255 sets of the publications of the Board relating to the modes of spreading and the best methods for the restriction and prevention of the dangerous communicable diseases, and 850 copies of

leaflet No. 226, "Data and Statements," to enable teachers to comply with the law, have been distributed.

About the usual number of pamphlets on the restriction and prevention of the dangerous diseases were sent to the health officers of localities in which dangerous diseases have been reported. It was at the same time requested of these health officers that the pamphlets be distributed *to the neighbors of the persons sick with such diseases*, and to such other persons as they would be likely to benefit. In response to special requests of sanitarians in this and other States, copies of the annual reports, reprints, proceedings of sanitary conventions, proceedings of meetings and other publications of this office have been sent where it was thought likely to benefit public-health interests.

The usual record of distribution of publications has been kept.

Reprinting of Leaflets, Diagrams, etc.

The proceedings of the quarterly meeting in April was printed to the number of 3,000 copies, for distribution.

In April the two-page leaflet with "Lives Saved by Public Health Work" (plate 825) on one side, and "Isolation and Disinfection Restricted Scarlet Fever and Diphtheria in Michigan during the 10 years 1887-96" (plate 922) on the other side, was reprinted to the number of five thousand copies, for distribution.

Ten thousand copies of the slip (No. 224—8th Ed.) were printed for use in the office in connection with outbreaks of consumption. Ten thousand copies of the four-page leaflet (No. 175), "The Restriction and Prevention of Consumption," were also printed, for distribution.

New Leaflets, etc.

Nos. 1, 2, 3 and 4 of the Teachers' Sanitary Bulletin were printed to the number of 20,000 copies of each issue, and have been widely distributed to teachers in Michigan, and others interested in sanitary science.

Accessions to the Library, Card-Cataloguing, etc.

Some 275 numbers of journals (weeklies, monthlies and quarterlies) and 107 books and pamphlets have been received (mostly in exchange for our publications) and entered in the library-accession books.

Some work has been done on the card catalogue of the library.

The usual work in connection with the financial accounts of the Board has been continued.

Hektograph Work.

Hektograph work to the amount of 35 pages has been prepared, and about 4,946 pages have been printed, including 1,027 pages of weekly and monthly bulletins, "Health in Michigan;" 268 pages, proceedings of the regular meeting of the State Board of Health, April 8, 1898; 350 pages, special meeting of the State Board of Health, May 13, 1898; and 250 pages, "Typhoid fever from ordinary streams."

Special Investigations.

Diphtheria became epidemic at Lewiston, Montmorency county, and June 8 Doctor George H. Cattermole was sent to that locality as communicable-disease inspector to help the local authorities to restrict the disease. He made bacteriological diagnoses confirming the presence of diphtheria. [His written report will be found printed in the annual report of the Board for 1899 in connection with "Diphtheria in Michigan in 1898."]

Kalamazoo High School Pupils Visited the Capitol.

May 20 an excursion containing the City Superintendent of Schools, the Principal of the High School, several teachers, and about 250 pupils from the Kalamazoo High School visited the Capitol building, and in each of the departments some per-

son explained to them the main features of the work as they passed through the several offices. The State Republican, in commenting upon the occasion, said: "One of the most interesting sights the pupils viewed in the departments was a map arranged by the State Board of Health showing the location of the dangerous communicable diseases in the State, by tacks, the heads of which were painted a different color for each of the different diseases. Kalamazoo had them all but small-pox."

In addition, several of the large wall diagrams of the office were exhibited, and two leaflet publications of the office were handed to each pupil as he passed through the office, one being the leaflet No. 226, "Data and Statements," etc., the other being the two plates, "Germs of Diseases," and the "Diseases Which Cause Most Deaths."

*Immigrants Probably Exposed to Communicable Diseases, Destined for Points in Michigan
— Notices to the State Board of Health, and by the State Board of Health to Local
Health Officers.*

During the quarter ending June 30, 1898, 3 notices were received from Thomas Fitchie, U. S. Commissioner of Immigrants at New York, stating that small-pox had occurred on board two steamships and diphtheria on board of one steamship arriving at New York City. Two notices were received from the surgeons of the steamships "Gallia" and "Scotsman," stating that cases of measles had been landed at Dominion Quarantine. All the steamships had on board passengers intending to settle in Michigan, and copies of the notices (14 in all) were sent to the health officers of the several places for which the immigrants were destined.

Work in Connection With Sickness Statistics.

During the second quarter of 1898, 2,822 blank report, receipt and return postal cards; 221 record books; 211 printed circulars; and 247 hektographed and type-written letters regarding weekly card reports, have been mailed to 337 health officers and regular correspondents; 1,329 weekly card reports have been received and entered on the register; 56 copies of the hektographed weekly bulletin, "Health in Michigan," were mailed each week, and 110 copies of the hektographed monthly bulletin, "Health in Michigan," were mailed each month. These bulletins have been consolidated for this quarterly report. Work has also been done on the compilation of the weekly card reports of sickness during the year 1897, for the annual report for 1898.

Health in Michigan in the Second Quarter of 1898—Communicable diseases.

Compared with the preceding quarter (January, February and March), reports from all sources show *diphtheria* to have decreased by an average of *twenty-one* places per month, *scarlet fever* to have decreased by an average of *eighteen* places per month, *typhoid fever* to have decreased by an average of *nineteen* places per month, *measles* to have increased by an average of *thirty-one* places per month, *whooping-cough* to have increased by an average of *three* places per month, *consumption* to have increased by an average of *twenty-eight* places per month and *small-pox* to have been present at *two* places less, in the second quarter of 1898.

*Meteorology at One Central Station, and Sickness Throughout Michigan, from all Causes,
Second Quarter of 1898, Compared with the Preceding Quarter.*

A comparison of meteorological conditions, at Lansing, of the second quarter of 1898, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been northerly (instead of northwest), the velocity two miles per hour less, the temperature 27.08 degrees higher, the rainfall .03 of an inch more, the absolute humidity much more, the relative humidity less, the day ozone slightly less, the night ozone more and the depth of water in the observation well 8 inches more, in the second quarter of 1898.

Compared with the preceding quarter (January, February and March), the reports from regular observers show a marked increase of remittent fever, intermittent fever, measles and consumption, and a marked decrease of pneumonia, influenza and pleuritis, in the second quarter of 1898.

The Weather and the Health in Michigan in the Second Quarter of 1898, Compared with the Average for the Corresponding Quarters in the Twelve Years, 1886-1897.

A comparison of the meteorological conditions, at Lansing, of the second quarter of 1898, with the average for the fourth quarters in the twelve years, 1886-1897, shows that in 1898 the prevailing direction of the wind was northerly (instead of northwest and southwest), the velocity .4 of a mile per hour less, the temperature .04 of a degree higher, the rainfall .32 of an inch less, the absolute and relative humidity and the day and night ozone less, and the depth of water in the observation well the same (26 inches).

Compared with the average in the corresponding quarters in the twelve years, 1886-1897, the reports from regular observers indicate that scarlet fever, whooping-cough, consumption, intermittent fever, remittent fever, erysipelas, inflammation of bowels and measles were less than usually prevalent in the second quarter of 1898.

GENERAL REPORT OF WORK IN THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1898.

Much of the work of the office naturally groups itself under three heads—the collection of information, the compilation and elaboration of information, and the dissemination of information. In the following outline that grouping is adhered to so far as is practicable without repetition.

COLLECTION AND COMPILATION OF INFORMATION.

RETURNS OF NAMES AND POSTOFFICE ADDRESSES OF HEALTH OFFICERS.

There is a local board of health in every township, and in every incorporated city and village in Michigan.

Every local board of health in Michigan is required by law to appoint and constantly have a health officer, and to report his name and address to the secretary of the State Board of Health at Lansing.

*Blanks for the return of the names and addresses of health officers are sent out by the secretary of the State Board of Health to the local officers about the first day of April, the law (§ 1634 Howell's Statutes) requiring the appointment and return to be made "within thirty days after the annual township meeting in each year."

In the secretary's quarterly report of work done during the second quarter of 1898, printed on preceding pages of this volume, is an account of the collection of this information relative to health officers in Michigan in 1898-99.

In April, 1898, the usual demand was made upon supervisors of townships, presidents and clerks of villages, and mayors and clerks of cities, for the return of names and postoffice addresses of health officers to serve in 1898-99. The circular and blank forms are similar to those printed on pages xiii-xiv of the Report of this Board for 1884. In June, 1898, a second demand was sent to the localities from which no return had been made in response to the demand in April. On the outbreak of a dangerous communicable disease in a township, city or village in which no health officer had been reported, a third and even a fourth demand for the

appointment of such officer, and the return of his name has been made; therefore the number of health officers returned increases until the close of the year for which such officers are appointed. At the close of the fiscal year ending June 30, 1898, the numbers for townships, cities and villages were stated in the quarterly report of this Office, printed on a preceding page.

Through the systems of reports to the State Board of Health by its corps of correspondents, as well as by the local health officers, and by a systematic searching of the local columns of the country newspapers published in Michigan, the secretary of the State Board often receives information of an outbreak of a communicable disease, and desires to communicate at once with the health officer; but if no health officer has been appointed in that locality, or no return of such appointment has been made, delay occurs, and before the secretary of the State Board can get into correspondence with the delinquent local board of health and a health officer can be chosen, the disease may spread widely within or without the limits of the village or township, with unnecessary sickness and loss of life. It should be said, however, that there is an increasing tendency to comply with this law, and local boards now generally act promptly and coöperate cordially with the State Board of Health in its endeavors to prevent the spread of dangerous communicable diseases.

The following table shows that for the year 1895 the highest per cent of localities filed annual reports with the secretary of the State Board of Health; even higher than either of the two succeeding years. This is because that up to and including 1895, health officers and clerks of the different localities were required by law to make reports, and since that time health officers only have been asked to report; and, for the year 1895, a special effort was made to obtain reports from the different health officers and clerks; repeated demands for annual reports were sent out as late as July, 1896. For the villages there was a slight decrease for the year 1897, as compared with previous years. It is gratifying to note that for the year 1897, the highest percentage of cities made reports.

TABLE.—Exhibiting, for Michigan, by cities, villages, and townships, the total number of political jurisdictions, the number from which **annual reports** were received by the secretary of the State Board of Health, and the per cent of all localities reporting for each of the six years, 1892-'7, and averages for the six years.

Year.	Political divisions.	Total number.	Number reporting.	Per cent reporting.
1892.	State.....	1,549	1,420	92
	Cities.....	87	51	76
	Villages.....	279	229	82
	Townships.....	1,203	1,140	95
1893.	State.....	1,559	1,455	93
	Cities.....	69	57	83
	Villages.....	283	255	90
	Townships.....	1,207	1,143	95
1894.	State.....	1,574	1,432	91
	Cities.....	69	55	80
	Villages.....	293	246	84
	Townships.....	1,212	1,131	93
1895.	State.....	1,585	1,502	95
	Cities.....	76	63	83
	Villages.....	292	262	90
	Townships.....	1,217	1,177	97
1896.	State.....	1,587	1,434	90
	Cities.....	76	65	86
	Villages.....	295	258	87
	Townships.....	1,216	1,111	91
1897.	State.....	1,581	1,418	90
	Cities.....	76	68	89
	Villages.....	296	249	84
	Townships.....	1,209	1,101	91
Averages six years 1892-7.	State.....	1,573	1,444	92
	Cities.....	72	60	83
	Villages.....	290	250	86
	Townships.....	1,211	1,134	94

SPECIAL REPORTS RELATIVE TO DANGEROUS COMMUNICABLE DISEASES.

Every health officer is supplied with blanks "L" from this office, for reporting outbreaks of diphtheria, typhoid fever, scarlet fever, small-pox, measles, etc., (dangerous communicable diseases) to the secretary of the State Board of Health, as required by law.

Upon the receipt of the report of an outbreak of such disease, blank "M" for weekly reports during the outbreak, are sent, with a circular letter ("Blue Letter"), also a number of pamphlets containing instructions for the suppression of the disease. These pamphlets are to be distributed to the neighbors of the family in which the disease is, in order to obtain their coöperation with the health officer.

About 3,618 outbreaks of such diseases were thus attended to during the fiscal year ending June 30, 1898.

Later, a blank is sent to the health officer of each such locality for a final report at the close of the outbreak, stating just what was done for the restricting of the disease, and with what result,—the number of cases and deaths, households invaded, what disinfectants were used, what exceptions, and other facts supplying important data for guidance of future efforts.

The facts thus collected are compiled for publication in the annual report of the secretary of the State Board of Health. In this annual report will be found the report of such facts relative to the dangerous communicable diseases in Michigan during the year 1897.

SICKNESS STATISTICS, WEEKLY POSTAL-CARD REPORTS OF ALL IMPORTANT DISEASES, IN 1897.

The weekly postal-card reports of diseases, on cards furnished by the State Board of Health, have been received from health officers of cities and villages and other leading physicians in active general practice who contribute this valuable information from different parts of the State. The plan of these weekly card-reports is described and illustrated on the second and third pages of the article entitled "The Time of Greatest Prevalence of each Disease," in Part II. of this volume. When a return of a new health officer was received, printed circular [81], demanding the weekly card reports and describing the method of making the same, together with supplies for making the reports, were sent to the health officer.

A list of the observers of diseases for the calendar year 1897, and a compilation of their reports, with a study of the relations of sickness to climatic conditions is printed in the article referred to in the preceding paragraph. The sickness statistics of Michigan, based upon these weekly reports by the leading physicians in the State, are probably the most important sickness statistics in the world.

The sickness statistics are made especially useful for the purpose of studying the causation of diseases, by reason of the excellent system of meteorological statistics which have been collected during such a long series of years as to make them exceedingly useful for such purposes.

ANNUAL REPORTS BY HEALTH OFFICERS FOR THE YEAR ENDING
DECEMBER 31, 1897.

In January, 1898, a circular [218] was sent to the health officer of each township, city and village in the State, about 1,585 in all, transmitting a blank form [I] for use in making his annual report to this office. This circular was substantially the same as circular [65] which is printed on pages viii-ix of the report for 1884. Blank form [1], for reports of health officers, is printed in former reports. With the circular [218] was also transmitted a blank for a copy of a record of diseases dangerous to the public health, similar to the blank which is printed, reduced in size, on page 271 of the report for 1882.

Where the name of the health officer has not been returned to this office, the blanks were sent to the president of the village, the mayor of the city, or the supervisor of the township, according as the vacancy occurred in a village, city, or township.

ANNUAL REPORTS BY CLERKS OF LOCAL BOARDS OF HEALTH, DISCONTINUED.

Since the change in the law (Sections 1675 and 1676 Howell's Statutes) went into effect, reports of cases of "diseases dangerous to the public health" are not made to the clerk; and, unless it has been impracticable to secure a satisfactory report from the health officer, no demand was made upon the clerk for an annual report.

RETURN OF NAMES OF MEDICAL PRACTITIONERS, DISCONTINUED.

Section 3, of Act 167, laws of 1883, as amended by Act 268, laws of 1887, provides that:

"It shall be the duty of the supervisor, at the time of making the annual assessment in each year, to make out a list of all the physicians and each student practicing under the instruction of a preceptor residing within his township, village, ward, or city, with the name, age, sex and color of each and the length of time each has been engaged in practice, and if a graduate of a regularly established and reputable college, the name of the college and the date of graduation. Such list shall be returned by the supervisor to the township, village, or city clerk, and by the clerk recorded in the book in which are kept the records of the local board of health, and annually on or before the first day of January such clerks shall furnish certified lists of the same to the secretary of the State Board of Health."

The State Board of Health has regularly, about April 1 in each year, sent blanks for the return of names of medical practitioners, to the supervisors of all townships, cities and villages in the State, in order to make it convenient for them to comply with this law. At the close of the year there were sent to the clerks of all townships, cities and villages, blanks on which to report to the State Board of Health the lists of physicians returned by the supervisors. Notwithstanding this effort, the returns have never been complete, in fact they were so incomplete that in 1897 the effort to collect these lists was abandoned.

The change in the law requiring all dangerous diseases to be reported

to the health officer was another reason for discontinuing the reports by clerks relative to medical practitioners.

METEOROLOGICAL REPORTS.

A list of meteorological observers for the calendar year 1897, with a statement of what registers were received from each, is printed in this report. The reports are summarized in an article in this report on the Principal Meteorological Conditions in Michigan in the year 1896, commencing on page 1 of Part II. The data are of great value for the purposes of studying the causes of diseases. The observations made at the office of the Board, at Lansing, have been summarized weekly, and a copy kept on file in the office.

DISSEMINATION OF INFORMATION.

PUBLISHED LIST OF NAMES AND ADDRESSES OF HEALTH OFFICERS.

The names and addresses of 1,430 health officers in Michigan, to serve in 1898-99, were collected and recorded in the office; but because of insufficient funds, the list of these health officers was not printed in pamphlet form.

DISTRIBUTION OF INFORMATION HOW TO PREVENT AND RESTRICT DANGEROUS DISEASES.

Whenever information was received of the first occurrence of diphtheria, scarlet fever, typhoid fever or typho-malarial fever, measles, whooping-cough, consumption, or small-pox, copies of a document on the restriction and prevention of the disease reported were immediately sent to the health officer, with a request that he distribute them where they will be likely to be read, and it is suggested that the neighbors of those families in which the sickness occurs would be most likely to read them at such times of danger, and it is thought that after reading them they will be most likely to coöperate with the local health officer for the restriction of the diseases. Thousands of pamphlets on each of the most dangerous communicable diseases are distributed by the State Board in this manner—in localities where the disease treated of in the pamphlet is present. They are being distributed in this way all the time, because there is no time when the State is free from scarlet fever or diphtheria, these being among the most important of the dangerous communicable diseases in Michigan. Copies of the documents on diphtheria, scarlet fever, and small-pox, in German or in Dutch, are also sent when it is thought they can be used to advantage. Owing to frequent requests for documents in French, Polish, Swedish, and Danish-Norwegian, translations of a leaflet on contagious diseases [47] have been made into each of these languages, and copies are sent to local boards of health when requested.

A record is kept of reports received, and of correspondence relative to each outbreak of a dangerous communicable disease of which the office

receives information. A compilation of such information relative to several of the most important diseases is published in this volume.

PRINTING AND DISTRIBUTION OF THE SECRETARY'S ANNUAL REPORT.

Comparatively few copies of the annual report of the secretary are published. The whole number published is not as large as the whole number of officers and members of local boards of health in Michigan. Only about six thousand copies of the reports are published for all purposes. Only a little over half (3,500 copies) of these are at the disposal of the State Board of Health. These reports are used in exchange with sanitary journals, with other State Boards of Health, with city boards of health in other States, and with health officials in other countries, with libraries, and to physicians in Michigan who contribute to the work of the Board. Michigan is a great and prosperous State, and it is believed that it is made richer, not poorer, by the influences exerted by the publications of the Michigan State Board of Health. But it is believed that better use would be made of the reports if they were all placed at the disposal of the State Board of Health. As the law now is many of the reports are wasted by being sent to the offices of county clerks, from which it is alleged that some of them are not taken except as waste paper.

PRINTING AND REPRINTING LEAFLETS, PAMPHLETS, DIAGRAMS, ETC., OF INFORMATION.

During the fiscal year ending June 30, 1898, a quarterly statement was made relative to printing and reprinting leaflets, pamphlets, diagrams, etc.; it will be found printed in the secretary's quarterly reports of work in the office.

INSTRUCTIONS TO NEWLY-APPOINTED HEALTH OFFICERS.

As fast as the names and addresses of health officers to serve in 1898 and 1899 were received, a copy of the pamphlet [120] detailing the duties of health officers, was sent to each one who had not served during the preceding year, together with blanks "L" for the prompt report of any dangerous communicable diseases, and sample copies of pamphlets on the restriction and prevention of diphtheria, scarlet fever, typhoid fever, measles, whooping-cough, and consumption; also a slip [224] relative to consumption being a dangerous disease and short statements relative to its prevention and restriction; and a leaflet [226] on the "Restriction and Prevention of Dangerous Communicable Diseases." Several leaflet diagrams, among which were two, one exhibiting the experience in Michigan in 1894 and 1895, in restricting scarlet fever, the other exhibiting the experience in restricting diphtheria during the year 1895, were sent. The pamphlet containing the laws relating to the public health which were in force in Michigan in 1890 is out of print.

HEALTH BULLETINS, WEEKLY AND MONTHLY, AND QUARTERLY REPORTS.

The weekly reports of diseases received up to Wednesday of the week following the week for which they are made, are compiled on that day.

week by week, and a bulletin, based on that compilation, is sent to each member of the State Board of Health, and to others interested in keeping a "finger on the public pulse," also to a number of newspapers, and to sanitary and medical journals. A specimen of this weekly health bulletin can be found on page xii of the report for 1884, and on page lxxxix of the report for 1894.

This subject of dissemination of information by means of bulletins is treated of in the article on "Time of Greatest Prevalence of each Disease" in Part II of this volume.

Beginning with the month of August, 1884, a *monthly* health bulletin has been issued immediately after the close of each month, for the use of members of the State Board of Health and others who are studying the subject. These bulletins are mailed to sanitary and medical journals. Beginning with the bulletin for the month of September, 1889, a third column was added, being the average for the bulletin month in a preceding series of years, beginning with the year 1886. This enables the reader to study and compare the prevalence of each disease in the last preceding month with the same disease in the corresponding month in the preceding series of years. An example of this form of bulletin is printed on pages xlv-xlvi, of the report for 1890, and on pages xcii-xciii of the report for 1894.

At the close of each quarter these monthly bulletins are consolidated for the secretary's "Quarterly Report of work in the Office, and statement of the conditions of health generally in Michigan", comparing the communicable diseases during the quarter just closed with the preceding quarter, to learn their increase and decrease; including also the meteorological conditions, and the sickness from all causes compared with the preceding quarter and with the average for corresponding quarters for the series of years beginning with 1886.

Beginning with January, 1890, and ending with February, 1891, a supplementary bulletin was prepared representing graphically the relative amount of sickness from each of the principal diseases in the month for which the bulletin was issued. This was sent with the regular monthly bulletin for the same month. A sample of this graphic bulletin is printed on page xlvii of the report for 1890, and one is printed on page 85 of the report for 1891.

DIAGRAMS OF INSTRUCTIVE EXPERIENCE IN MICHIGAN.

Two diagrams, "Isolation and Disinfection Restrict Diphtheria" and "Isolation and Disinfection Restrict Scarlet Fever", have been printed, and many hundreds of them distributed as heretofore mentioned. They exhibit, in a condensed form, the experience of the health officers in Michigan, with these two important diseases, relative to scarlet fever in 1894 and 1895, and diphtheria in 1895. The evidence in them is similar to that in similar diagrams which have been published for other years; therefore the evidence gains greatly in strength. They prove that in those localities in which isolation and disinfection are enforced the deaths from scarlet fever and diphtheria are only about one-fifth as many as there are in localities where these measures are not enforced.

ABSTRACTS OF PROCEEDINGS OF MEETINGS OF THE STATE BOARD.

Abstracts and brief accounts of the proceedings of meetings of the State Board of Health are prepared, hektographed or printed, and distributed as soon as practicable after the meeting. During this year, however, because of lack of means, not any of these abstracts were printed in pamphlet form. (Abstracts of the minutes of meetings are printed on preceding pages of this report.) The distribution of these abstracts is not the same for all meetings, being to different classes of persons, according to the nature of the contents, in some instances being sent to sanitary and medical journals, in other instances to teachers, health officers and others.

SECRETARY'S QUARTERLY REPORTS OF WORK IN THE OFFICE.

At the close of each quarter, the secretary prepares a brief report of the work done in the office. This report is presented and portions of it generally read at the next regular meeting; and, if the abstract of the proceedings of the meeting is printed, this report is printed in the same pamphlet.

REPRINTS.

Reprints of articles in the report and in proceedings of sanitary conventions, have been made in pamphlet form, and sent in answer to queries, in letters, that can best be answered in that manner. For instance, many reprints of the article relative to alleged nuisances in the preceding year have been thus sent out, in response to questions.

REPORTS OF COMMITTEES, DELEGATES, ETC.

HOW FAR SHOULD MANDATORY MEASURES GO IN DEALING WITH:

(A) MEASLES? (B) WHOOPING-COUGH? (C) LEPROSY? (D) TUBERCULOSIS?*

REMARKS, IN OPENING THE DISCUSSION, BY HENRY B. BAKER,
LANSING, MICHIGAN.

MEASLES.—I believe such measures should extend; 1. To compulsory notification, by the householder, of every case not already reported by a physician; compulsory notification by the physician of every case, and possibly nominal compensation, say ten cents for each such report. On this point of compensation to physician, I am not sure that it is necessary. It is so provided in the Michigan law. Dr. Rohé, in an able paper on this subject, says: "The report of deaths and contagious diseases should be considered by the physician as a high public duty; one that he alone can satisfactorily perform, and for which he should scorn to ask or receive compensation."

* Presented at the Nashville Meeting of the National Conference of State and Provincial Boards of Health, August 19, 1897.

"A Connecticut court has declared that 'it is universally understood to be one of the implied and necessary conditions upon which men enter into society and form governments, that sacrifices must sometimes be required of individuals for the general benefit of the community, for which they have no rightful claim to specific compensation.' (Bradley vs. N. Y. & N. H. R. R. Co., 21 Conn., 306)."

Notification is useful:—

(a) To enable the local health officer to promptly act for the restriction of the disease.

(b) To serve as a starting point for the supplying of facts for compilation, in order to learn the facts needed for intelligent dealing with the subject.

(c) To enable the local health officer to notify the State Board of Health, to receive from the State Board of Health leaflets of instructions how to restrict the disease, and to distribute such leaflets liberally to the neighbors of infected premises.

Relative to measles, and to any other disease concerning which the people generally are not convinced of the importance of restricting the disease, the most important work by health authorities is the education of the people, as to the extent of the danger from the disease, the fact that the disease may be restricted, and as to the great gain in life, health, and money values by the restriction of the disease.

Compulsory notification is essential as a starting point for any systematic work. And that should certainly be enforced, and educational work should be pushed to the utmost.

2. I believe mandatory measures *should* extend to the prompt isolation of every infected person and thing, and to their disinfection before coming in contact with healthy persons. But for the restriction of any disease, the action by the people themselves is as important as the action by the health officials. Unless the coöperation of the people can be had, isolation of infected persons cannot be enforced. In Michigan, the law specifying the duties of health officers makes it their duty to order the isolation of every sick and infected person, unless the local board of health directs the health officer differently. The local board of health is supposed to be able to judge of the public sentiment in its locality, and whether restrictive measures can or cannot be enforced. Local boards, however, sometimes begin their efforts out of the order of best sequence. In the city of Detroit, recently, there has been a marked instance of an unsuccessful effort at the forcible restriction of measles, unsuccessful because the forcible restriction was commenced before the people had been educated as to the importance of restricting measles.

As regards measles, and in fact every communicable disease the restriction of which is to be commenced in any locality, the first effort should be for the education of the people as to the necessity for action.

I believe it is a general law that people can not be taught, on any subject, except they first have their interest awakened. When there is no threatening danger of a disease, people cannot be taught relative to it. When there is immediate danger they can be taught. These facts in sociology supply the reason why the first mandatory requirement is for compulsory notification of the occurrence of measles, in order that advantage

* Proceedings of Public Health Conference. Baltimore, Md., Feb. 17 and 18, 1897. pp. 24-25.

may be taken of the knowledge of its occurrence to educate the neighbors of the infected persons and premises.

The best plan is for the State Board of Health to supply the educational data and statements, and for the local health officers to distribute such data and statements.

As fast as communities are sufficiently educated to coöperate for the restriction of measles, or any other disease, the restriction of that disease should be enforced, by the compulsory isolation of all infected persons and things, and their complete disinfection before permitting their unrestricted movement.

WHOOPIING-COUGH.—Precisely the same remarks made relative to measles may properly be made relative to whooping-cough.

LEPROSY.—In Michigan and in most of the States of this Union, there is no case of leprosy; and in my opinion the danger of the introduction of leprosy in those States is so small that the disease may almost be disregarded. The education of the people relative to leprosy has already been accomplished in most States. It is generally recognized as a dangerous communicable disease. Therefore, in most States, nothing stands in the way of the approved methods of restricting such a disease,—namely, the isolation of infected persons and things, and their disinfection before permitting unrestricted movement.

In any State or Province in which there is leprosy and in which the necessity for restrictive measures in leprosy is not generally recognized, I believe it is the imperative duty of the State or Provincial Board of Health immediately to take such action as shall tend to create an intelligent public sentiment which shall make it possible to limit the disease to the present generation, or at least to a restricted area.

In my judgment, mandatory measures should extend to: (1) Compulsory notification by the householder and by the physician; (2) Isolation of every infected person, and (3) Disinfection of every possibly infected thing.

TUBERCULOSIS.—What I have said relative to the education of the people concerning measles, I wish to have considered repeated concerning tuberculosis, which I believe to be the most important disease.

Mandatory measures should include compulsory notification, and the distribution of instructions to patients, relatives of patients, and others liable to be infected.

Disinfection of every infected thing should also be mandatory.

In tuberculosis in animals I think that isolation or destruction should be insisted upon.

I think that isolation of human beings having tuberculosis should not be uniformly insisted upon.

I believe that it is practicable for intelligent and conscientious consumptives, even in the stage of the disease when the danger to the public is greatest, to so carefully disinfect the sputa, and to so dispose of all infected discharges, that the public need not be endangered by the unrestricted movements of such consumptives.

But consumption being, in every State in the Union, the most dangerous communicable disease with which we have to deal, mandatory measures should extend to the isolation of every person who is likely to spread the infection of that disease. This would include all insane consumptives, and all others who are not sufficiently intelligent and con-

scientious to take such measures as to thoroughly prevent the spread of the disease.

In Michigan, the phraseology of the law specifying the duties of the health officer is such that this can be done. The law makes it the duty of the health officer, "To order the prompt and thorough isolation of those sick or infected with such disease, so long as there is danger of their communicating the disease to other persons." This seems to me to be the correct plan. In every doubtful case, some official should be the judge whether or not there is danger to the public. On this subject, the local health officer is, as a rule, likely to be the best judge. In coming to conclusions in such cases local health officers may well be aided by clear statements formulated by the State Board of Health. Such statements would tend toward uniformity of action throughout a State.

If this conference can formulate clear and concise statements on this subject, it will undoubtedly tend toward uniformity of action throughout this continent.

But uniformity of action is of infinitely less consequence than correct action; and unless the action favored is the best possible action there had best be no attempt at uniformity.

TRANSPORTATION OF CORPSES.

In the proceedings of the meeting of this Board for January, 1898, on a preceding page of this volume, will be found a statement of the proposed changes in the rules and regulations of the National Association of General Baggage Agents. At the January meeting of this Board a Commission, consisting of the President and Secretary of the State Board of Health and five prominent funeral directors, was appointed to draft a plan for carrying the proposed change into effect in Michigan. The report of the Commission, made Feb. 25, is as follows:—

REPORT OF THE COMMISSION APPOINTED BY THE STATE BOARD OF HEALTH TO REPORT A PLAN FOR CARRYING INTO EFFECT IN MICHIGAN, THE RULES OF THE GENERAL BAGGAGE AGENTS' ASSOCIATION OF THE UNITED STATES, RELATIVE TO DEAD BODIES.

To the State Board of Health, Lansing, Michigan:

GENTLEMEN:—Your Committee appointed to devise plans for putting into effect the new rules for the transportation of dead bodies, beg to present the following:

In order that the funeral directors of the State of Michigan may be enabled to comply with the requirements of the railroad and steamboat transportation companies, in the matter of the shipment of dead bodies, we respectfully recommend:

First, That your Board issue certificates to such embalmers as may wish to avail themselves of the privileges of the shipment of dead bodies under the new rules, provided such embalmers are qualified to disinfect said bodies so that their transportation shall not endanger the public health.

Second, That the qualifications of embalmers be determined by a commission consisting of two members of the State Board of Health, and three members of the State Funeral Directors' Association.

Third, That this commission shall hold quarterly examinations at Lansing or

such place as may be directed by the State Board of Health, and shall recommend to the State Board of Health such embalmers for certificates as shall in their judgment pass a satisfactory examination upon the subjects required.

Fourth, That the examination shall be upon the subjects of anatomy, embalming, and those branches of Sanitary Science which relate to bacteriology and to the modes of spreading, measures for isolation and disinfection and other measures for the restriction of the dangerous communicable diseases.

Fifth, That the standard of proficiency to entitle an embalmer to a certificate shall be determined by the examining commission, previous to each examination, account being taken of the character of the questions to be answered.

Sixth, Rules for the conduct of such examinations shall be framed by the examining commission, and approved by the State Board of Health.

Seventh, That the funeral directors on this examining commission shall be nominated by the executive committee of the State Funeral Directors' Association, and receive their appointment from the State Board of Health.

Eighth, That the members of the examining commission shall be entitled to receive their necessary expenses to and from Lansing, or other place of meeting.

Ninth, That, in order to defray the expenses of the commission, each applicant for a certificate shall pay a fee of ten dollars for such certificate, such fee to be returned if said applicant fails to pass the examination; and each embalmer holding a certificate shall pay an annual registration fee of one dollar; and any certificate may be revoked if the annual registration fee is not paid within thirty days after January 1, of each year.

The foregoing report was made at the special meeting of this Board, February 25-26, and the report thoroughly discussed; but, upon question of the legality of the proposed actions of the Board, the subject was referred to Judge Aaron V. McAlvay, the legal member of the Board, with request that he report on the legal aspects of the proposed new work. At the regular meeting, April 8, 1898, he made a written report as follows:—

To the State Board of Health of the State of Michigan:

GENTLEMEN:—As a committee of your honorable body, to which was referred the report of a plan for carrying into effect in Michigan the Rules of the General Baggage Agents' Association of the United States, relative to dead bodies, the following is respectfully submitted:

Your committee strongly favors every measure that can be legally adopted to protect the public health, and believes that the act establishing this Board gives it plenary power. The question which arises in the consideration of the matter submitted for investigation is whether such powers can be delegated to, and exercised by persons not members of this Board, in cases where there is no statutory provision. Our courts, in analogous cases, have decided against such proposition. The plan submitted for consideration contemplates the organization of a commission composed partly of persons not members of this Board, who shall conduct the examinations of candidates applying to this Board for certificates as embalmers of dead bodies. I do not think that the law under which this Board is authorized to act, contemplates any such proceedings; and I believe that in case any question was raised as to the authority of a person to act under such certificate, the courts would hold such action illegal.

The further proposition to charge fees for issuing certificates, does not need consideration, unless proposed in some other manner than according to the plan submitted; and even then, it is the opinion of your committee that there is no authority for making charges for such certificates.

If this Board can carry into effect the new Rules of the General Baggage Agents' Association referred to, without special legislation on the subject, it is suggested that it might possibly be done through the local health officers, and some system of certification might be devised by this Board that would be in the nature of an indorsement of the local officers' acts. It is admitted that the probabilities are that under such circumstances embalming would not be scientifically performed, but if this Board furnishes local health officers with specific instructions as to the preparation and disinfection of dead bodies, and the undertaker performing the work makes affidavit that such instructions have been followed, your committee believes that the transportation companies would receive the bodies for transportation if

accompanied by the affidavit aforesaid, and the certificate of the local officer with the indorsement of this Board.

The foregoing is the only plan your committee has been able to suggest, in the absence of legislation giving specific authority in the premises.

A copy of the report of the commission appointed by this Board is hereto annexed, and made a part of this report.

All of which is respectfully submitted.

A. V. McALVAY,
Committee.

After Judge McAlvay's report, the Board discussed the subject, but the members could not see their way clear to undertaking the new work. It is regretted that the Board cannot enter upon and enforce the changes in the rules, which, in several ways, seem to improve those now in force. It is hoped that some plan may yet be devised whereby the regulation and supervision of the transportation of dead bodies may be done in accordance with the wishes of those interested in best serving the public, and in protecting the public health.

COUNTY MUST ALLOW CLAIMS OF PHYSICIANS WHO HAVE BEEN AUTHORIZED BY THE BOARD OF HEALTH TO CARE FOR COUNTY POOR.

The Supreme Court of Michigan granted application of Doctor Archibald J. McKillop for mandamus to compel the Board of Supervisors of Cheboygan County, Michigan, to allow his bill for services rendered during an epidemic of dangerous communicable disease. The opinion was filed April 19, 1898; it was written by Justice J. B. Moore, and was concurred in by the other justices of the court. The opinion is as follows:—

"In 1894 an epidemic of diphtheria prevailed in the township of Nunda, Cheboygan county. There were so many cases the schools were closed and prompt action became necessary. The relator is a practicing physician. An arrangement was made with him by the board of health of the township that he should take charge of the patients as physician and nurse, bury the dead, if any, that supplies should be furnished through him, that he should quarantine the houses, where there were cases of the disease, and take all necessary steps to check and control the disease. There were between thirty and forty cases, and a number of deaths. The relator carried out the instructions of the Board and gave nearly all his time to the work. In December, 1894, he presented a bill for his services, to the board of health, for six hundred and forty-seven dollars, which was allowed and certified. Later he presented a bill for one hundred and seventy-nine dollars and twenty-five cents, which bill was also allowed and certified. These bills were afterwards presented to respondents. The first one was allowed at five hundred dollars, the second one at one hundred dollars. The relator then filed a petition in the circuit court for a writ of mandamus to compel the respondent to pay all his bills as allowed by the township board of health. An answer was filed and a trial had before a jury. Questions of fact were submitted to the jury which with their answers were as follows:

"1st.—Was relator a regular practicing physician, duly qualified to practice under the laws of the State of Michigan?

"Answer—Yes.

"2nd.—Did relator perform the services for which he presented a bill of account?

"Answer—Yes.

"3rd.—In auditing relator's bill did the Board of Health of the Township of Nunda fraudulently combine with relator to allow same?

"Answer—No.

"4th.—Was relator a member of the board of health of the township of Nunda and did he take part in auditing his own bills?

"Answer—No.

"5th. In auditing relator's bills did the board of health of the township of Nunda carefully consider same and allow same at what they considered his services worth and as a charge against the county of Cheboygan?

"Answer—Yes.

"6th.—Did relator protest against the allowance of his bills in part by the Board of Supervisors?

"Answer—Yes.

"7th.—Were the services rendered by the relator in the treatment of persons affected with a contagious disease and residing in the county of Cheboygan?

"Answer—Yes.

"The answer stated that the portions of the bill not allowed were not allowed because of the persons treated were able themselves to pay for treatment. As no issue was found on the statement the circuit judge held it must be deemed to be true. The judge regarded the verdict of the jury as advisory, simply, and denied the writ for two reasons: First, because mandamus was not the proper remedy; second, because services rendered to patients able to pay would not be a charge against the county, basing his decision upon *Farnsworth vs. Supervisors*, 56 Mich., 640. As to the first reason, as early as the case of *Bristow vs. Supervisors of Macomb county*, 3 Mich., 475, it was decided in this court that mandamus was the proper remedy in these cases and from that time until now mandamus has been regarded as a proper remedy.

Farnsworth vs. Supervisors of Kalkaska Co., 56 id., 640.

Elliot vs. Kalkaska Supervisors, 58 id., 452.

Stafford vs. Board of Health, 67 N. W. R., 1094.

St. Johns vs. Supervisors, 70 N. W. R., 131.

"As to the second reason assigned for not issuing the writ. In *Farnsworth vs. Supervisors supra*, part of the claim disallowed by the board of supervisors was for services rendered without any direction of the board. The other claim disallowed, was for services rendered by a physician who was a member of the township board of health. There is language used in this opinion that tends to support the view taken by the trial judge of this case. But we think the later case of *Elliot vs. Kalkaska supervisors* 58 id 452 should control. In the last named case the relator's claim was for services as nurse in a pest house at four dollars a day. The supervisors allowed two dollars, and claimed that some of the patients were able to pay for their own necessities and that the charge was exorbitant. In disposing of the case Justice Campbell used this language, 'Relator Elliot was employed to act as nurse there, and it in no way concerned him what was the pecuniary standing of its inmates. The board of health have the power and responsibility of providing such a house and nurses to attend it. It was held in *Rae vs. Flint*, 51 Mich., 526, that the public is primarily responsible for such expenditures, and that it would be contrary to public policy to endanger the public health by making it impracticable to employ help who would not be sure of their pay. The exigency of a pestilence will not wait for the convenience of parties, and measures must be prompt and effectual. The board of health must have power to make necessary contracts, and this involves all their terms. This was decided in the early case of *Bristow vs. Supervisors of Macomb County*, 3 Mich., 475. There was nothing in Elliot's claim which was open to inquiry before the supervisors, and they should have allowed it as presented. There is no possible issue left open.'.....

"It is very much to be regretted that respondents have been so ill advised as to attempt to avoid the payment of these claims. The statutes designed to protect the community from infection are of the utmost importance, and persons cannot be compelled to risk their lives to take charge of patients unless they choose to do so. Suitable and competent persons cannot be procured without fair remuneration. It would be dangerous in the extreme if such matters could be left open to the caprice of any public body, after the immediate danger is ended, where notions of thrift may interfere with those of humanity. The law has not left these matters open to any such risk, and it is the duty of the courts to see that it is not disregarded.'

"In this case the record shows the emergency was very great, the relator testified that in rendering the service he relied upon the promise made to him by the board of health, that he should be paid what his services were reasonably worth and would not have rendered service if he had supposed he must look to the patients for his

pay. His case comes directly within the reasoning employed in *Elliot vs. Supervisors*, *supra*.

"If in emergencies of this kind it is understood the agreements made by the boards of health, cannot be enforced, the statutes designed to protect the community in these times requiring prompt action of the board of health will be rendered nugatory.

"The writ will issue as prayed. The other justices concurred."

A PLEA FOR THE TEACHING OF SANITARY SCIENCE IN THE PUBLIC SCHOOLS.*

BY HENRY B. BAKER.

That great modern philosopher—Herbert Spencer—was, I believe, the first person to clearly put before the world the question and the reply to that question—"What knowledge is of most worth?"

In his book on education he reached a conclusion, which seems to be very evident, that *that knowledge is of most worth which tends directly to preserve life*. His plea was that educational efforts should be made according to that great truth. His work was published many years ago. Have we yet realized his view? Certainly not. The educational forces are not yet primarily directed toward teaching the preservation of life, either of the individual or of the species. Personal hygiene has come to have a place in educational work, but only an incidental place, and public health—the general safety, which is of much greater importance than individual safety—has not until last year had any place whatever in our educational system. This leads naturally to my present question—*In educational work, what is really of most importance, for the general welfare?*

Is it not that there shall be general, long-continued, healthy and happy existence of the pupils educated?

It may be granted at once that even if a majority of the pupils are to die before or soon after they come to be self-supporting, it is still important that those who are to survive shall be well educated.

But, is it not evident that the greatest good to the greatest number requires that the greatest possible number shall continue on through the productive years of life in the healthy enjoyment of their education, and in the employment of their educated energies for the general good? I think we must acknowledge that this is true.

Then we need to carefully consider in this connection two facts:—*First*, That under past educational methods, although a majority of those educated continue to exist, a considerable proportion of the pupils are now being "educated," as we call it, only to be at once swept off the face of the earth. To give us a clearer conception of this important fact, permit me to ask your attention to diagrams exhibiting the mortality in Michigan from the two diseases which cause most deaths among young adult persons,—consumption and typhoid fever. Notice the deaths in early adult life.

Of what use to the individuals who are dead, or to the welfare of the survivors, are all the vast sums of money expended, and the laborious work of the schools for ten or twelve years, on the hundreds of pupils who in every year are taken away from us, when all the results of those great efforts are swallowed up in death?

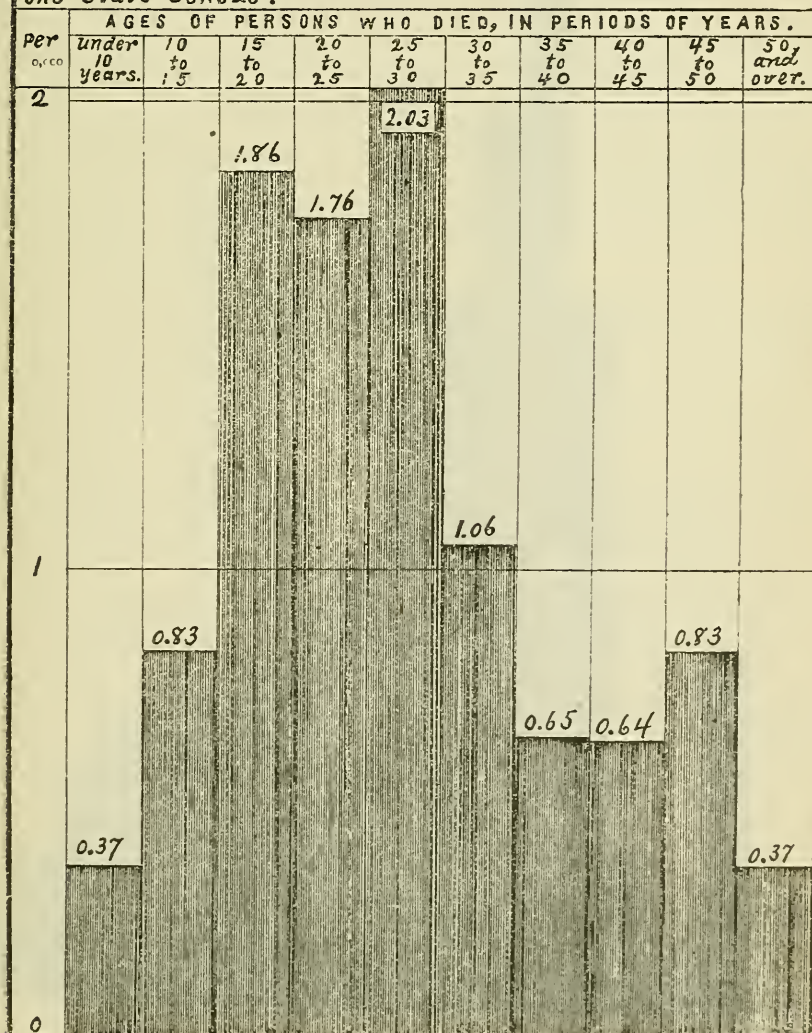
*Read before the Michigan Schoolmasters' Club, Ann Arbor, March 27, 1896.

The *second* fact is one that I shall not take your time to demonstrate, but only to state my firm belief in its truth; it is that these deaths from these most important causes are now known to be preventable, and by measures which can easily be taught in the schools.

How can there be any argument against making such instruction primary, fundamental, general, and thorough, from kindergarten to university?

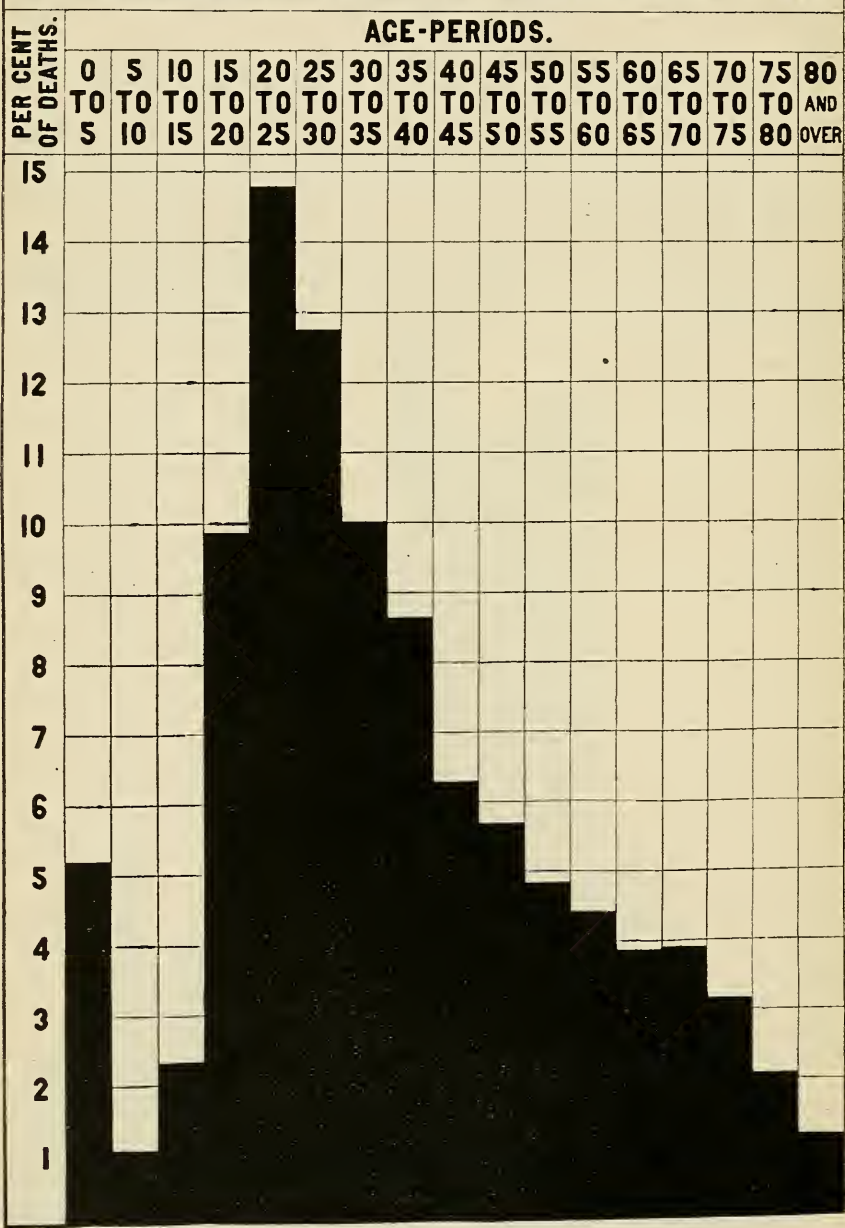
AGE-DISTRIBUTION OF DECEDENTS FROM TYPHOID FEVER .

Exhibiting by age groups the average proportionate numbers of deaths in Michigan in the 2 years 1892-93 per 10,000 persons living in June 1894, according to the State Census.



DEATHS FROM CONSUMPTION, BY PERIODS OF AGE.

REPORTED DEATHS FROM CONSUMPTION IN MICHIGAN DURING THE 6 YEARS 1891-6, -THE PER CENT IN EACH PERIOD OF AGE.



When teachers are to enter upon this work, they need to know, at once, just what are these most important causes of sickness and death, which are preventable; and just how they are preventable; and what shall be accepted and taught as the best measures for their restriction and prevention. These questions of right instruction involve health or sickness, life or death, of many persons, therefore "the blind should not be permitted to lead the blind." In Michigan, advantage is now taken of the fact that the State has long had an organization for the special purpose of searching out the causes and best measures for the restriction and prevention of diseases, and for the supervision of the health interests of the people; that organization—the State Board of Health—is now entrusted with the duty of preparing the data and statements for the use of teachers in imparting this knowledge "tending directly toward the preservation of life," more especially toward public health.*

One reason why it is important that this instruction shall be general, as it is made by the recent law, is that with reference to some of the dangerous communicable diseases "no man lives to himself alone," his life or death depends almost constantly on the action of other persons. This is especially true relative to consumption—the most destructive of all diseases. For the restriction and prevention of such diseases all classes of people must coöperate. Such general coöperation can never be obtained except through general knowledge on the subject; this, I think, supplies a powerful demand that such knowledge shall be generally taught, in the public schools.

I have tried to impress upon you clearly one good and sufficient reason for teaching in the schools sanitary science; which reason is that only as a result of teaching such "knowledge of most worth" can the results of the other educational work become most completely and most generally available and useful through a long series of years; therefore, *this is one of the most important educational works which can be done for the public welfare.*

On the same principle, I have asked your attention to the most important branch of sanitary science—the restriction and prevention of the most dangerous diseases; also to the fact that, although these diseases are all preventable, many of them are so only by such general coöperation as can be attained through general instruction. This most important branch of this important subject the Legislature of Michigan has had the wisdom to provide by law shall be taught in our public schools, and it is now receiving the earnest attention of the grand army of educators in this State. It gives me great pleasure to know that your association so enters into the spirit of this glorious work that you devote to it this entire half day of your valuable time. Surely those of us who humbly labor at the crank can see that the world does move, in a useful direction. It is pleasant to see this movement go forward. I thank you for this opportunity to make a plea for its vigorous continuance.

*The State Board of Health has issued a four-page leaflet containing the "Data and statements" required to be sent to teachers in every year. The Board also issues a monthly "Teachers' Sanitary Bulletin", designed to supplement the data in the leaflet.

REPORT OF THE SECRETARY RELATIVE TO PROPERTY, ETC., FOR THE FISCAL YEAR ENDING JUNE 30, 1898.

To the President and Members of the Michigan State Board of Health.

GENTLEMEN:—In compliance with Section 5 of Article II of the by-laws of this Board, the following report of the "Nature and amount of property belonging to the Board, which has been received, issued, expended, and destroyed since the last report, and of the property remaining on hand, and also in whose care each item of property is intrusted," is respectfully submitted:—

Preceding reports should enable one to learn the items of property on hand at the beginning of the fiscal year 1898. My last report is printed on pages xcii-xciv of the Annual Report for 1897. Since last report, instruments and articles of a similar nature have been purchased as follows:

PHOTO-ENGRAVED PLATES PURCHASED.

- One plate—Distribution of Measles in Mich., 7 years, 1889-95.
- One plate—Distribution of Typhoid Fever in Mich., 7 years, 1889-95.
- One plate—Distribution of Scarlet Fever in Mich., 10 years, 1886-95.
- One plate—Distribution of Diphtheria in Mich., 10 years, 1886-95.
- One plate—Average Annual number of reported cases and deaths from the different dangerous communicable diseases in Michigan, per 10,000 population, during specified periods of years.
- One plate—Exhibiting the numbers of outbreaks of Diphtheria, Typhoid fever, Measles and Scarlet fever, of which the beginnings were stated.
- Five plates relating to Weekly Reports of Sickness in Michigan in 1896.
- Fifteen plates relating to the Meteorological conditions in Michigan in 1896.
- One plate—Diphtheria in St. Clair Co. in 1896.
- One plate—Diphtheria in Wayne Co. in 1896.
- One plate—Diphtheria in Huron Co. in 1896.
- One plate—Isolation and Disinfection restricted Diphtheria in Mich. in 1896.
- One plate—Movements of Contagium of Diphtheria in Mich. in 1896.
- One plate—Movements of Contagium of Scarlet fever in Mich. in 1896.
- One plate—Pathogenic Micro-organisms, "Germs" of Disease.
- One plate—Isolation and Disinfection restricted Scarlet fever and Diphtheria in Mich., 10 years, 1887-1896.
- One plate—Distribution of Diphtheria in Mich. in 1896.
- One plate—Distribution of Scarlet fever in Mich. in 1896.
- One plate—Location of sewer and catch-basins for U. P. Hospital for Insane, Newberry, Mich., as suggested by the State Board of Health.
- One plate—Isolation and Disinfection restrict Scarlet fever in Mich. in 1896.
- One plate—By Age and Sex, the reported number of Deaths per 10,000 population from Scarlet fever in Mich., 4 years, 1893-96.
- One plate—Isolation and Disinfection restrict Measles in 1896.
- One plate—Isolation and Disinfection restrict Typhoid fever in Mich., 7 years, 1890-96.
- One plate—Movements of Contagium of Measles in Mich. in 1896.
- One plate—Distribution of Measles in Mich. in 1896.
- One plate—Distribution of Typhoid fever in Mich. in 1896.
- One plate—Distribution of Consumption in Mich. in 1896.
- One plate—Movements of Contagium of Typhoid fever in Mich. in 1896.
- One plate—Reported number of Deaths from Measles in Michigan in each of the 29 years, 1868-96, per 100,000 persons living.
- One plate—Reported number of Deaths from Consumption in Michigan in each of the 28 years, 1869-96, per 100,000 persons living.
- One plate—Reported number of Deaths in Mich. for each of the 30 years, 1867-96, from all causes; from specified diseases, and from the specified communicable diseases, per 10,000 inhabitants.
- One plate—Lives saved by Public Health Work.

One plate—By Age and Sex, the average number of reported Deaths from Diphtheria in Mich. per 10,000 persons living,—5 years, 1892-96.

One plate—By Age and Sex, the average number of reported Deaths from Measles in Mich. per 10,000 persons living,—5 years, 1892-96.

One plate—By Age and Sex, the reported number of Deaths from Typhoid fever in Mich. per 10,000 population, 6 years, 1891-96.

One plate—Isolation and Disinfection restrict Measles in Mich., 7 years, 1890-96.

PROPERTY LOANED.

Many photo-engraved plates were loaned to Robert Smith Printing Co., State Printers and Binders, Lansing, to be used in printing Annual Reports and other publications of this Board. Most of these plates have been returned, but a few still remain charged to them on the property loan book of this Office. The plates will probably be returned as soon as the State Printer is through with them.

INSTRUMENTS PURCHASED SINCE LAST REPORT.

One twelve inch boxwood triangular scale.

One padlock and chain for raingauge at this office.

One galvanized iron snowgauge for use at this office.

One steelspring bow pen.

Two drawing pens.

One hard rubber folding parallel rule.

One T Square.

One new tube and attached thermometer for barometer No. 2252.

One new tube for barometer No. 2579.

One new tube and bag for barometer No. 2196.

METEOROLOGICAL INSTRUMENTS ISSUED.

None issued.

METEOROLOGICAL INSTRUMENTS RETURNED.

One barometer, and box for protection, one dry-bulb thermometer, one wet-bulb thermometer, board, clips, cup, and wick, one maximum and one minimum registering thermometers, with board, etc., for hanging, by C. E. Beers, Adrian, Mich.

One barometer, and box for protection, one dry-bulb thermometer, one wet-bulb thermometer, board, clips, and wick, one maximum and one minimum registering thermometers, with board, etc., for hanging, one raingauge and measuring stick for raingauge, by Edward Cahill, Petoskey, Mich.

METEOROLOGICAL INSTRUMENTS ACCIDENTALLY BROKEN WHILE IN USE BY OBSERVERS.

One wet-bulb thermometer, one minimum registering thermometer, two barometer tubes, 1 barometer thermometer.

METEOROLOGICAL INSTRUMENTS AND OTHER PROPERTY ON HAND.

6 Standard barometers (including one in use in this office).

11 dry-bulb thermometers (including one in use in this office).

10 wet-bulb thermometers (including one in use in this office).

6 minimum self-registering thermometers (including one in use in this office).

8 maximum self-registering thermometers (including the one in use in this office).

1 standard thermometer.

1 standard thermometer for inspecting oills.

8 registering thermometer boards (including one in use in this office).

14 psychrometer boards (including one in use in this office).

4 psychrometer cups (including one in use in this office).

9 minimum thermometer clips.

7 psychrometer clips.

10 screw bolts for registering thermometers.

11 pins for registering thermometers.

3 hooks for hanging barometer.

5 barometer boxes (including one in use in this office).

1 raingauge tube.

1 raingauge in use at this office.

2 caps for overflow tubes.

2 large galvanized iron pails, to measure snowfall.

- 1 Draper's self-registering thermometer.
- 2 anemometers, for use at this office.
- 2 circular magnifying hand glasses.
- 3 psychrometer cups, spoiled by rust and long use.
- 8 psychrometer cups; injured by use, can be repaired.
- 32 broken thermometers (includes all, since observations have been taken).
- 1 worn out anemometer spindle.
- 310 sheets ozone test-paper.
- 1 hard rubber triangle, 13 inch.
- 1 hard rubber triangle, 6 inch.
- 1 dotting instrument.
- 1 adjustable curve ruler.
- 1 parallel ruler—wood.
- 4860 slips of ozone test-paper.
- 1 parallel ruler, hard rubber.
- 2 steelspring bow pens.
- 4 drawing pens.
- 1 T square.

ACCESSIONS TO THE LIBRARY.

Books and other publications have been received and placed in the library of the Board during the fiscal year ending June 30, 1898, as follows:—

BY GIFT, EXCHANGE, ETC. (Names and addresses of donors are printed in italics.)

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| <p><i>Abbott, Dr. S. W., Sec., Boston, Mass.:</i>
Epidemic Cerebro-Spinal Meningitis and its Relation to Other Forms of Meningitis. Report of the Massachusetts State Board of Health.
Report of Massachusetts State Board of Health, 1896.
Sewage Purification in Cities and Towns in Massachusetts.
The Filter of the Water Supply of the City of Lawrence and its Results. 3rd Ed.
Typhoid Fever and its Relation to Water Supplies. Water Supply and Sewerage. Senate Doc. No. 4.
Vital Statistics of Massachusetts, 1856-95.</p> <p><i>Arenberg, Prince d', France:</i>
Ecole Speciale D'Architecture, Année 1897-98.</p> <p><i>Australian Health Society, Melbourne, Aus.:</i>
Instructions of What to do in Cases of Scarlet Fever.—No. 1.</p> <p><i>Bailey, Geo. W., Jr., Sec. State, Montpelier, Vt.:</i>
Fourth Registration Report, Vermont.
Fifth Registration Report, Vermont.
Sixth Registration Report, Vermont.</p> <p><i>Baker, Wm. C., Mayor, Providence, R. I.:</i>
Inaugural Address of Mayor of Providence, R. I., Jan. 3, 1898.</p> <p><i>Barthwell, Willis A., Librarian, Brooklyn, N. Y.:</i>
Fortieth Annual Report of Brooklyn Library, 1898.</p> <p><i>Bentley, H. L., Special Agent, Washington, D. C.:</i>
Cattle Ranges of the Southwest—Bulletin No. 72.</p> <p><i>Berner, H., Commissioner, Christiania, Norway:</i>
Beretning om Folkemaengden og Sundhedstilstanden i Aaret 1896.</p> <p><i>Bertillon, Dr. Jacques, Director, Paris, France:</i>
Annuaire Statistique de la Ville de Paris, Prefecture de la Seine, Vol. XVIe Année, 1895.</p> | <p><i>Biggs, Dr. Herman, New York:</i>
Instructions for Medical School Inspectors, Oct., 1897—New York Health Department.</p> <p><i>Billings, Dr. J. S., Librarian, New York:</i>
Bulletin of New York Public Library, Vol. II, No. 3, March, 1898.</p> <p><i>Blasius, Prof. D. R., Braunschweig, Germany:</i>
Festschrift zur 69 Veromunlung Deutsches Naturforscher und Aerzte, 1897, pp. 150-187.</p> <p><i>Bliss, Richard, Librarian, Newport, R. I.:</i>
167th Annual Report Redwood Library, Newport, R. I.</p> <p><i>Board of Health, Cambridge, Mass.:</i>
Annual Report of Board of Health, Cambridge, Mass., 1897.</p> <p><i>Board of Health, Burlington, Vt.:</i>
Annual Report of Health Officer of Burlington, Vt., 1897.</p> <p><i>Board of Health, Dayton, Ohio:</i>
Annual Report of Board of Health, Dayton, Ohio, year 1897.</p> <p><i>Board of Health, Manchester, N. H.:</i>
Report of Board of Health, Manchester, N. H., year 1897.</p> <p><i>Board of Health, Wilmington, Del.:</i>
Report of the Board of Health of Wilmington, Del., 1897.</p> <p><i>Bockh, R., Director of Bureau of Statistics, Berlin, Ger.:</i>
Statistisches Jahrbuch der Stadt Berlin, 1895.</p> <p><i>Boobyer, Philip, M. B., Health Officer, Nottingham, Eng.:</i>
Annual Health Report of the Borough of Nottingham, England, 1896.</p> |
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- Boubnoff, Prof. S., M. D., Director, Moscow, Russia:*
Report of Municipal Sanitary Laboratory, Moscow, Russia, 1896.
- Bowen, D. C., Clerk, Asbury Park, N. J.:*
Annual Report of Board of Health, Asbury Park, N. J., Oct. 1, 1896.
- Breunell, Chauncey W., Sec. State, Montpelier, Vt.:*
34th Report of the Legislature of Vermont.
35th Report of the Legislature of Vermont.
36th Report of the Legislature of Vermont.
37th Report of the Legislature of Vermont.
38th Registration Report, Vermont.
39th Registration Report, Vermont.
- Brigham, Dr. Edwin H., Librarian, Boston, Mass.:*
Medical Communications of the Massachusetts Medical Society.
- Bryan, E. A., Director, Seattle, Wash.:*
Influenza—Bulletin No. 22, Wash. State Agricultural Experiment Station, October, 1896.
- Bryce, Dr. P. H., Sec., State Board of Health, Ontario, Canada:*
15th Annual Report of the Provincial Board of Health, Toronto.
16th Annual Report of Provincial Board of Health of Ontario, Canada, 1897.
Registration Report of Ontario, 1896.
- Bureau of Statistics, Albany, N. Y.:*
Bureau of Statistics of Labor, New York State.
- Bureau of Statistics, Berlin, Germany:*
Statistik der Ehescheidungen in der Stadt Berlin in den Jahren 1885 bis 1894.
- Bureau of Statistics, Frankfort am Main, Germany:*
Statistics of the City of Frankfort am Main, year 1897.
- Bureau of Statistics, Hamburg, Germany:*
Vericht des Medicinalrathes über die Medicinische Statistik des Hamburgischen Staates für das Jahr 1896.
- Burrows, Dr. J. G., Sec., Melbourne, Aus.:*
Infant Feeding—Bulletin No. 6.
22nd Annual Report of Australian Health Society, years 1896-97.
- Burgerstein, Dr. Leo, Wien, Hamburg, Germany:*
Mittel zur Verbreitung hygienischer Kenntnisse in der Bevölkerung.
- Butterfield, K. L., Supt., Agricultural College, Mich.:*
Michigan State Farmers' Institutes, years 1896-97.
- Carmalt, Dr. Wm., Sec., Philadelphia, Pa.:*
Transactions of the Congress of American Physicians and Surgeons, Vol. IV, 1897.
- Cary, C. A., Veterinarian, Auburn, Ala.:*
A New Milk or Water Sterilizer.
Meat Inspection.
- Cantwell, Dr. A. W., Member Board Health, Davenport, Iowa:*
Annual Reports of the Officers of the City of Davenport, Iowa, year ending March 1, 1897.
- Chaillé, Dr. Stanford E., New Orleans, La.:*
A National Health Organization and Other Sanitary Needs of New Orleans.
Prevention of Yellow Fever and the Quarantine of Houses to Stamp it out.
- Chapin, Dr. Chas. V., Health Officer, Providence, R. I.:*
15th Annual Report of Supt. of Health of Providence, R. I., year 1897.
42nd Annual Report of Births, Marriages and Deaths, City of Providence, R. I., 1896.
- Christie, W. H. M., Astronomer Royal, Greenwich, Eng.:*
Greenwich Magnetical and Meteorological Observations, 1894.
- Christian, L. T., Sec., Richmond, Va.:*
Virginia Funeral Directors' Report, 1897.
- Church, W. L., C. E., New York City:*
The Purification of Sewage by Bacterial Oxidation.
- City Bureau of Statistics, Berlin, Germany:*
Die Arbeiter-Kranken-Versicherung in Berlin im Jahre 1896.
- City Clerk, Boston, Mass.:*
Report of Special Committee on Disposing of City Ofal [Document 91—1893], Boston, Mass.
- Clark, Harry, Supt., Ann Arbor, Mich.:*
Annual Report of University Hospital, Mich.
- Clapp, Otis F., C. E., Providence, R. I.:*
Annual Report of City Engineer of Providence, R. I., year 1897.
- Cocchi, A., Director Bureau Statistics, Rome, Italy:*
Mortality Statistics for Rome, Italy, year 1897. }
- Coe, Dr. Henry C., New York:*
In Memoriam—Wm. Thompson Lusk, M.D., LL.D.
- Cohen, Mendos, Chairman, Baltimore, Md.:*
Report of Sewerage Commission of Baltimore, 1893.
- Cokenower, Dr. J. W., Sec., Des Moines, Iowa:*
Transactions of Iowa State Medical Society, 1897.
- Commissioner of Education, Washington, D. C.:*
Report of Commission of Education, Vol. II, 1895-96.
- Commons, S. A., Clerk, Lansing, Mich.:*
Report of Board of State Auditors, 1897, Michigan.
- Cone, James B., Sec., Hartford, Conn.:*
74th Annual Report of Officers of the Retreat for the Insane at Hartford, Connecticut. April. 1898.
- Conn, Dr. G. P., Concord, N. H.:*
Relation of Railway Companies to State Boards of Health.

Transactions of New Hampshire State Medical Society, May, 1897.

Cornell University, Experiment Station:

Powdered Soap as Cause of Death among Swilled Hogs—Bulletin No. 141.

Second Report on Potato Culture—Bulletin No. 140.

Third Report on Japanese Plums—Bulletin No. 139.

Coulthard, Dr. Geo. E., Sec., Fredericton, N. B.:

11th Annual Report of New Brunswick Board of Health, year ending Oct. 31, 1897.

Cox, Hon. Joseph L., Commissioner, Lansing, Mich.:

15th Annual Report of Commissioner of Labor of Michigan, 1898.

Crane, Henry W., Sec., New York:

127th Annual Report of New York Hospital Society, year 1897.

Cruls, L., Director, Rio de Janeiro, Brazil:

Annuário Publicado Pelo Observatorio do Rio de Janeiro, Brazil, 1897.

Curtiss, Chas. F., Director of Iowa Experiment Station:

Some Essentials in Beef Production—Bulletin No. 71.

Dabney, Chas. W., Jr., Asst. Sec., Washington, D. C.:

Yearbook of Department of Agriculture, 1896.

Dean, Benj. W., Sec. State, Montpelier, Vt.:

Third Registration Report, Vermont.

Department of Agriculture, Washington, D. C.:

Accessions to the Department Library, April, June, 1897.

Bee Keeping—Bulletin No. 59.

Bulletin No. 55, U. S. Department of Agriculture.

Butter Making on the Farm—Bulletin No. 57.

Edible and Poisonous Mushrooms, Jan., 1898.

Farmers' Bulletin No. 65—Experiment Station Work II.

Marketing Farm Produce—Bulletin No. 62, Farmers'.

Reference List to Publications, Relating to.

The Dairy Health, its Formation and Management, Farmers'.

U. S. Department of Agriculture—Bulletin 54—

Some Common Birds in their Relation to Agriculture.

Department of Interior, Washington, D. C.:

Bulletin No. 3—Department of Interior—"Sewage Irrigation."

Devey, Davis R., Ph.D., Sec. Institute Technology, Boston, Mass.:

Quarterly Journal American Statistical Association, Vol. V, for Sept. and Dec., 1897, and March, 1898.

Dewey, Melvil, Librarian, Albany, N. Y.:

State Library Bulletin, Legislation No. 9.

Director of Central Meteorological Observatory, Tokio, Japan:

Annual Report of Central Meteorological Observatory of Japan, year 1895, Part I.

Doty, Dr. A. H., Health Officer of Port of New York, N. Y.:

Disinfection by Steam.

Duncan, Dr. J. A., Sec., Ohio:

Transactions of Ohio State Medical Society, year 1897.

Eaton, Dr. P. J., A.M., Pittsburg, Pa.:

Daily Medical Inspection of the Public Schools.

Ekama, Dr. H., Director, Amsterdam, Holland:

Report Meteorological Institute of Nederland, 1896.

Emery, Dr. Z. Taylor, Health Commissioner, Brooklyn, N. Y.:

Report on the Sanitary Condition of the Water Supply of Brooklyn, N. Y., Dec., 1897.

Report of Brooklyn Department of Health, 1896.

Evans, Dr. James, Sec., Florence, S. C.:

18th Annual Report of South Carolina State Board of Health, year 1897.

Fitzpatrick, Dr. Chas. B., New York City:

Notes on a Yellow Fever Prophylactic Fluid.

Foster, Dr. Eugene, Pres., Augusta, Ga.:

19th Annual Report of the Board of Health of Augusta, Ga., for the year 1896.

Foster, Wm. E., Librarian, Providence, R. I.:

12th Annual Report of Providence, R. I., Public Library, 1897.

Fox, Prof. C. P., Moscow, Idaho:

Bulletin No. 10, Agricultural Experiment Station, Idaho.

Francis, Chas., C.E., Davenport, Iowa:

The Problem of Sewage Disposal.

Frazer, Dr. E. B., Sec., Wilmington, Del.:

9th Biennial Report of the Board of Health of Delaware, 1895-96.

Fries Bros.:

Formaldehyde Disinfection.

Fulton, Dr. J. S., Sec. State Board of Health, Baltimore, Md.:

Proceedings of Public Health Conference of Maryland, Feb. 17 and 18, 1897.

Transactions of Medical and Chirurgical Society of Maryland, 1896-97.

Proceedings of the Public Health Conference at the Hall of the Medical and Chirurgical Faculty, Baltimore, Md., Feb. 17 and 18, 1897.

Gardner, Hon. Washington, Sec. State, Lansing, Mich.:

29th Registration Report of Michigan, 1895.

Geissler, Dr. A., Director, Dresden, Saxony:

Kalender und Statistisches Jahrbuch für das Königreich Sachsen, 1898.

Zeitschrift des k. Sachsichen Statistischen Bureau Jahrgang, 1897, Heft 1 and 2.

Zeitschrift des k. Sachsichen Statistischen Bureau, 43, Jahrgang, Heft 3 and 4.

Zeitschrift des k. Sachsichen Statistischen Bureau, 43, Jahrgang, 1897, Beilage.

Gerhard, Wm. Paul, C.E., New York City:
The Plumbing, Water Supply and Drainage of Hospitals.

Gerrish, W. B., C.E., Oberlin, Ohio:
Report of Water and Sewer Departments, Oberlin, Ohio, 1898.

Gill, Dr. H. Z., Sec., Topeka, Kan.:
Typhoid Fever—Pamphlet by Kansas State Board of Health.

13th Annual Report of Kansas State Board of Health, 1897.

Giddings, Theron F., Commissioner, Lansing, Mich.:

Michigan Insurance Report—Fire and Marine—Part I, 1897.

Michigan Insurance Report—Life, Casualty, Assessment and Fraternal—Part II, 1897.

Goto, Dr. Shimpei, Director, Tokio, Japan:
Annual Report of Central Sanitary Bureau of Japan, years 1893-1894.

Gresswell, Dr. D. A., Chairman Board of Health, Victoria, Australia:

Report on Drinking Water and Air Disconnection.
Report on Means of Isolation in Victoria.

Hamilton, Dr. J. H., Sec., Richford, Vt.:
3d Annual Report of the Secretary State Board Health, Vt.

4th Annual Report of the Secretary State Board Health, Vt.

5th Annual Report of the Secretary State Board Health, Vt.

6th Annual Report of the Secretary State Board Health, Vt.

7th Annual Report of the Secretary State Board Health, Vt.

8th Annual Report of the Secretary State Board Health, Vt.

9th Annual Report of the Secretary State Board Health, Vt.

10th Annual Report of the Secretary State Board Health, Vt.

Laws of Vermont Relating to State and Local Boards of Health, Public Health and the Preservation of Life.
Regulations Promulgated by the State Board of Health of Vermont.

Site, Construction and Furnishing of School Houses.

Hammond, Hon. J. E., Supt. Public Instruction, Lansing, Mich.:

Suggestive Special Day Programs.

Harris, Hon. Wm. T., Commissioner, Washington, D. C.:

Report of Commissioner of Education, 1895-96, Vol. I.

Hess, Dr. J. L., Health Officer, Cleveland, Ohio:
24th Annual Report of the Health Division of the City of Cleveland, Ohio, 1896.

25th Annual Report of the Health Division of the City of Cleveland, Ohio, 1897.

Hills, Prof. J. H., Director, Burlington, Vt.:
10th Annual Report of Vermont Agricultural Experiment Station, 1896.

Hinsdale, Dr. Guy, Sec., Philadelphia, Pa.:
Transactions of American Climatological Association, Vol. 13, 1897.

Holmes, Dr. Bayard, Sec., Chicago, Ill.:
Transactions of the Association of American Medical Colleges, Philadelphia, Pa., May 31, 1897

Hope, Dr. E. W., Medical Officer of Health, Liverpool, England:

Report of the Health of Liverpool, 1896.
Health Department, City of Liverpool, year 1897.

Hunt, Dr. Mary H., Supt.:
Report of the Department of Scientific Temperance Instructions in Schools and Colleges 1896-97.
An Epoch of the Nineteenth Century.

Hurty, Dr. J. N., Sec., Indianapolis, Ind.:
Indiana State Board of Health Report, years 1895-96.

Imperial Bureau of Health, Berlin, Germany:
Ergebnisse der Todesursachenstatistik, year 1895.
Ergebnisse der amtlichen Pockenlodesfallstatistik im Deutschen Reiche vom Jahre 1896.

Imperial Bureau of Statistics, Berlin, Germany:
(1) Die Heilanstalten des Deutschen Reiches, 1892, '93 und '94.

(2) Die Zahl der Sterbefälle und deren Hauptursachen in einigen deutschen und ausserdeutschen städten Städtegruppen und Staaten.

(3) Die Thätigkeit der im Deutschen Reiche errichteten staatlichen Anstalten zur Gewinnung von Thierlymphe während des Jahres 1896.
Statistisches Jahrbuch für das Deutsche Reich, 1897.

Vierteljahrshefte zur Statistik der Deutschen Reichs Jahrgang, 1897.

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Vierteljahrshefte zur Statistik des Deutschen Reichs, Jahrgang, 1897, Zweiten Heft.

Janssens, Dr. E., Director and Chief Inspector, Brussels, Belgium:

Annuaire Demographique et Tableau Statistiques des Causes de Deces. Year 1897.

Johnston, Dr. Alex., Med. Supt., Glasgow, Scotland:

Report of Glasgow (Scotland) Fever and Small-pox Hospitals, 1896.

Report of Glasgow (Scotland) Fever and Small-pox Hospitals, 1897.

Johnson, Dr. Wyatt, Bacteriologist, Montreal, Canada:

A Biological Analysis of the Montreal Water Supply, Nov., 1890, to Nov., 1891.

A Case of Infection by the *Bacillus Aërogenes Capsulatus*.

Introductory Lecture on Hygiene, Public Health and Preventive Medicine.

Revue Statistique des Enquetes Tenues par la Cour du Coroner du District de Montreal, Pendant Annee 1893.

Three Cases Illustrating the Value of Bacteriological Diagnosis of Leprosy for Public Health Purposes.

Kempster, Dr. Walter, Commissioner of Health, Milwaukee, Wis.:

Report of the Commissioner of Health of Milwaukee.

Kennedy, Dr. J. F., Sec., Des Moines, Iowa:

8th Biennial Report of the Iowa State Board of Health, year ending June 30, 1895.

Report of Iowa State Board of Health, 1897.

Kimball, Sumner I., Supt., Washington, D. C.:

Report U. S. Life-Saving Service, 1896.

Kirkpatrick, Dr. Thos., Sec., Topeka, Kan.:

12th Annual Report Kansas State Board of Health, 1896.

Knopf, Dr. S. A., New York:

The Urgent Need of Sanitoria for the Consumptive Poor of our Large Cities.

Lamoreaux, Dr. John, Sec., Lansing, Mich.:

Transactions of Michigan Eclectic Medical Society, 1895.

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Langley, S. P., Sec. Smithsonian Institution, Washington, D. C.:

Report of U. S. National Museum, 1891.

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Langton, H. H., Librarian, Toronto, Canada:

University of Toronto Studies.—No. 1. Public Debts in Canada.

Lee, Dr. Benj., Sec., Harrisburg, Pa.:

Proceedings of 3rd Annual Conference of Associated Health Officers of Pennsylvania, Harrisburg, Jan. 23 and 24, 1896.

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Mackie, Wm. A., Clerk, New Bedford, Mass.:

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Marsh, Prof. Harriet A., Detroit, Mich.:

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Marshall, Prof. Chas. E., Agricultural College, Mich.:

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25th Annual Report Local Government Board of England, 1895-96.

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Causes of Tuberculosis and the Means for Stamping it out.
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Consumption in Michigan during the year 1895. [Reprint No. 499.]

Diphtheria in Michigan during the year 1895. [Reprint No. 493.]

Kerosene and Gasoline in Michigan in 1895. [Reprint No. 504.]

Measles in Michigan during the year 1895. [Reprint No. 496.]

Poisoning by Cheese, etc., in Michigan in 1895. [Reprint No. 502.]

Proceedings of the Sanitary Convention held at Hanover, June 3 and 4, 1897. [No. 505.]

Scarlet Fever in Michigan during year 1895. [Reprint No. 494.]

Small-Pox in Michigan during year 1895. [Reprint No. 500.]

Summary—Communicable Diseases in Michigan in 1895. [Reprint Nos. 495 and 501.]

The Prevention of Tuberculosis (Consumption). [Reprint No. 506.]

The Time of Greatest Prevalence of each Disease in Michigan in 1895. [Reprint No. 492.]

Typhoid Fever in Michigan during year 1895. [Reprint No. 497.]

Whooping-cough in Michigan in 1895. [Reprint No. 498.]

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Symptoms, Description and Duration of Contagious Diseases.

Sheldon, Dr. C. S., Madison, Wis.:

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Smith, Dr. Chas. D., Sec., Portland, Me.:

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Smith, Hon. W. O., President, Honolulu, Hawaii:

Report of Hawaii Board of Health, two years, ending Dec. 31, 1897.

Smithsonian Institution, Washington, D. C.:

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Annual Report of State Geologist, New Jersey, 1896.

Snellen, Maurits, Director, Utrecht, Holland:

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Staples, Dr. Franklin, Health Officer Winona, Minn.:

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Annual Report of Board of Health, Winona, Minn., year ending March 31, 1898.

Steel, Hon. Geo. A., State Treas., Lansing, Mich.:

Report of Treasurer of State of Michigan, 1897.

Sternberg, Dr. Geo. M., Surgeon-General, Washington, D. C.:

Index Catalogue Library Surgeon-General's Office. Vol. II. Second series

Stevens, Dr. J. V., Chicago, Ill.:

Manual of Eclectic Medicine and Surgery, Vol. 4.

Stewart, D. R., Broxborough, Scotland:

The Deadly 73° (Kerosene oil).

Stokes, Dr. Wm. Royal, Baltimore, Md.:

The Microscopic Examination of Milk.

Stupart, R. F., Director, Toronto, Canada:

Report of the Meteorological Service of Canada for 1895.

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A New Ataxiograph.

The Colorado Sanitarium.

A Visit to the Colorado Sanitarium.

Report of Cases Illustrating the Successful Treatment of Some Severe Forms of Nervous Diseases.

Report of Fifty Cases of Successful Treatment of Pulmonary Tuberculosis.

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- Tanaka, I., Librarian, Tokio, Japan:*
Report of Tokio Library, 1896.
- The Jewell Filtration Co., New York, N. Y.:*
The Jewell Water Filter.
- Thornton, Dr. G. B., Pres., Memphis, Tenn.:*
19th Annual Report of Memphis, Tenn., Board of Health, year 1897.
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A Hand-book on the Annexation of Hawaii.
- Truax, Greene & Co., Chicago, Ill.:*
Formaldehyde in General Disinfection.
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Annual Report of Board of Health, City of Newport, R. I., year 1896.
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Annual Register—University of Chicago.
- Venable, E. P., Sec., Chapel Hill., N. C.:*
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De la Prueba Pericial y de los Peritos.
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The Suppression and Prevention of Tuberculosis of Cattle and its Relation to Human Consumption. [Bull. 118.]
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Statistics of Manufactures, 1896, Mass.
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Report of Department of Street Cleaning of New York City.
- Wesseliuss, Hon. Sybrant, Commissioner, Lansing, Mich.:*
Report of Railroad Commissioner, Michigan, year 1897.
- Wilmot Castle Co., Rochester, N. Y.:*
Catalogue of Sterilizers, Water Stills and Food Warmers.
- Wilson, W. A., Sec., Grand Rapids, Mich.:*
Annual Report of Board of Health of Grand Rapids, 1896-97.
- Winders, Dr. Frank, Sec., Columbus, Ohio:*
Ohio State Board of Medical Registration. Report, 1897.
- Wingate, Charles F., C. E., Supt., Director, N. Y.:*
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- Wingate, Dr. U. O. B., Sec., Madison, Wis.:*
Biennial Report of Wisconsin State Board of Health, years 1895-96.
- Withrow, Dr. J. M., Health Officer, Cincinnati, Ohio:*
Report of Board of Health, Cincinnati, Ohio, year 1897.
- Wood, Dr. E. M., Sec., Winnipeg, Manitoba, Canada:*
Bacteriological Laboratory—Circular of Information, issued by Provincial Board of Health, Manitoba.
- Woods, Dr. J. T., Health Officer, Toledo, Ohio:*
Annual Report of Health Division, Toledo, Ohio, year 1896.
- Woodward, Dr. Wm. C., Health Officer, Washington, D. C.:*
Annual Report of Health Officer of District of Columbia, 1897.
- Wright, Hon. Carroll D., Commissioner, Washington, D. C.:*
11th Annual Report of the U. S. Commissioner of Labor, 1895-96.
- Wright, Dr. J. W., Health Officer, Erie, Pa.:*
Annual Report of Health Officer, Erie, Pa., 1897.
- Wyman, Dr. Walter, Surg.-Gen., Washington, D. C.:*
Weekly Public Health Reports, Vol. 12, 1897.
- Young, Dr. A. G., Registrar and Secretary, Augusta, Maine:*
Maine Registration Report of Maine State Board of Health, 1894-95.

ACCESSIONS BY PURCHASE.

The Aurora Borealis, by Alfred Augot.
The Story of the Atmosphere, by Douglas Archibald.
The Story of the Solar System, by G. F. Chambers.
Index to the Reports of the Medical Officers to the Privy Council and Local Government Board of England, 1858-1893.
Text-book of Bacteriology, by Geo. M. Sternberg, M. D.
St. Bartholomew's Hospital Reports, Vol. 26, 1890.
26th Annual Report Local Government Board of England, 1896-97.
Street Cleaning, by Geo. E. Waring, C. E.
Headache and Neuralgia, by J. L. Coming, M. D.
A History of Prostitution, by W. W. Sanger, M. D.
Epidemics and Isolation Hospitals, by R. McNeill, M. D.
The Story of Germ Life, by Prof. H. W. Conn.
Testing Milk and its Products, by Farmington & Woll.
Sanitary Engineering, by Gerhard.
The Origin and Spread of Pandemic Diphtheria, by Dr. Arthur Newsholme.

LOANS FROM THE LIBRARY.

The "Library Loan Book" is a permanent record of the office, and a complete record of the loan and return of books belonging to the library is kept in that book. The books remaining loaned at the end of the fiscal year appear in that book.

The following table exhibits the amount and kind of hard paper on hand at the time of making the last report, the amount purchased during the year, the amount used, and the amount now on hand.

Kind of Paper.	On hand at last report.		Purchased since last report.		Used during the fiscal year.		On hand June 30, 1898.	
	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.	Reams.	Sheets.
Flat.....		450	7		2	320	5	130
Crown.....	3	285	9		6	059	6	226
Folio Post.....	22	243	32		37	083	17	160
Demy.....	7	110			2	059	5	51
Medium.....	3	78				3	3	75
Byron Weston.....		124						124
Imperial.....	1						1	
B. Hornet (linen).....			3			100	2	380
Letter heads, office, (linen).....		3,000		8,000		4,900		6,100
Letter heads, members (linen).....		25		2,000		1,025		1,000
School Cap.....	1	432				192	1	240
Legal Cap.....	1						1	
Blotting paper.....		185		240		225		200
Blue cover paper.....	7				5		2	
Postoffice paper.....	1	200					1	200
Book paper, S. S. C. white.....	2	450			1	419		31
Manila paper.....	5	456			4	081		375

There are now on hand 3,500 sheets of hard paper of half letter size. There were about 147,116 envelopes on hand at the time of making the last report, 126,000 of the various kinds used in the office have been purchased since, making a total of 273,116. There are now on hand 76,139 printed envelopes, and 101,959 blank envelopes, making a total of 178,098; about 95,018 have been used in the work of the office.

Postage money on hand at beginning of fiscal year (July 1, 1897) \$68.04. Vouchers for postage (for use in the office) have been allowed during the year to the amount of \$1,265.93. Postage money on hand at end of fiscal year (June 30, 1898) was \$86.59. The cost of postage during the fiscal year ending June 30, 1898, was \$1,247.38, as follows:

Distribution of annual reports.....	\$339 88
Distribution of small pamphlets and circulars.....	178 91
Sending weekly and monthly bulletins.....	40 89
Collection and dissemination of information in regard to communicable and other diseases	260 55
Sending announcements and programs for sanitary conventions.....	54 57
Sending meteorological material to observers.....	6 65
Work in connection with the collection of sickness statistics.....	78 22
Securing annual reports from health officers and clerks.....	2 91
Securing name and postoffice address of health officers.....	36 33
Distribution of school literature to teachers and others.....	33 88
Distribution of "Quarterly Bulletins" (pound rate of postage).....	5 08
Distribution of Teachers' Sanitary Bulletins (pound rate of postage).....	18 06
Regular and special correspondence of the office, postal cards, and all other postage (including a considerable amount for distribution of documents on the restriction of diphtheria, scarlet fever, small-pox, etc., to localities where those diseases occurred).....	191 45
	<hr/>
	\$1,247 38

TOTAL AMOUNT AND CLASSIFICATIONS OF EXPENDITURES (UNDER ACTS
§1, 1873, AND 241, 1881) BY THE STATE BOARD OF HEALTH, AS PER
VOUCHERS 2793-2941, INCLUSIVE, ALLOWED DURING THE
FISCAL YEAR ENDING JUNE 30, 1898.

Chemical Analyses	\$9 88
Expenses of Members:—	
Attending Meetings	193 18
Other Official	264 32
Instruments and books.....	220 00
Paper, Stationery, etc.....	448 96
Postage:—	
Office	765 93
Members	55
Printing and Binding.....	535 99
Secretary	3,000 00
Expressage	433 74
Telegrams	22 75
Telephone and messages.....	24 88
Miscellaneous	49 81
Special investigations	25 44
	<hr/>
	\$5,994 93

TOTAL AMOUNT AND CLASSIFICATIONS OF EXPENDITURES UNDER ACT 142,
1897, BY THE STATE BOARD OF HEALTH, AS PER VOUCHERS 1-28,
INCLUSIVE, ALLOWED DURING THE FISCAL YEAR
ENDING JUNE 30, 1898.

Chemical Analyses	
Expenses of Members:—	
Attending Meetings	
Other Official	\$30 82
Instruments and books.....	150 30
Paper, Stationery, etc.....	260 43
Postage:—	
Office	700 00
Members	
Printing and Binding.....	394 65
Secretary	
Expressage	24 33
Telegrams	1 75
Telephones	35
Miscellaneous	204 43
Special investigations	
	<hr/>
	\$1,767 06

EXPENDITURES BY THE STATE BOARD OF HEALTH IN THE CALENDAR
YEAR, 1897.

The foregoing is reported, in compliance with law, relative to the fiscal year. But the appropriations of the Board are for the calendar year, and they amount to eight thousand five hundred dollars. The expenditures for any calendar year, therefore, cannot exceed eight thousand five hundred dollars. The following is a classified statement of expenditures for the calendar year 1897.

CLASSIFIED STATEMENT OF EXPENDITURES (UNDER ACTS 81, 1873, AND 241,
1881) BY THE BOARD DURING THE CALENDAR YEAR, 1897.

Chemical Analyses	\$8 50
Expenses of Members:—	
Attending Meetings	130 79
Other Official	224 74
Instruments and books.....	158 23
Paper, Stationery, etc.....	375 34
Postage:—	
Office	1,100 00
Members	10
Printing and Binding.....	472 06
Secretary	3,000 00
Expressage	400 47
Telegrams	19 58
Telephone	23 60
Miscellaneous	86 58
	<hr/>
	\$5,999 99

CLASSIFIED STATEMENT OF EXPENDITURES UNDER ACT 142, 1897, BY THE
BOARD DURING THE CALENDAR YEAR, 1897.

Chemical Analyses .....	.....
Instruments and books.....	\$94 95
Paper, Stationery, etc.....	62 70
Postage:—	
Office	300 00
Printing and Binding.....	22 22
Expressage	11 62
Miscellaneous	202 76
	<hr/>
	\$694 25

EXPENDITURES ON ACCOUNT OF THE BOARD.

The appropriations (\$8,500) at the disposal of the State Board of Health are for certain specified purposes, not including clerk hire, the publication of the annual report, or the expenses in the examination of plans for public buildings; these expenditures *on account of* but not by the Board are provided for by other acts of the legislature than those appropriating money to be expended by the Board, and the accounts are kept in other offices; not in the office of the State Board of Health; the accounts for clerk hire are kept by the Auditor General, and are reported in his annual report; the accounts for publication of the annual report of this Board, and for expenses in the examination of plans for public buildings, are kept by the Board of State Auditors, and are published in the annual report of that Board.

Respectfully submitted,

HENRY B. BAKER,

Secretary.

[PART II.]

PRINCIPAL METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1897.

COMPARISONS OF CONDITIONS IN 1897 WITH THOSE IN PRECEDING
YEARS.

A COMPILATION OF REPORTS BY OBSERVERS FOR THE STATE BOARD OF HEALTH
AND FOR THE UNITED STATES WEATHER BUREAU.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH.

In the Annual Reports of this Board, there has been published for each of the years 1877 to 1896, inclusive, a summary relative to the principal meteorological conditions as observed during the year. This paper continues the subject for the year 1897. The names of the observers for that year, and the months in that year for which copies of registers of meteorological conditions were received from each, are stated in Exhibit 1. In Exhibit 2, is given the latitude, longitude, and elevation of each of these stations. In the tables which follow, reports received from any observer for less than half the year have not been used.

The principal conditions treated in the following tables are temperature, relative and absolute humidity of the air, cloudiness, fogs, rainfall, ground water levels, ozone, velocity and direction of the wind, and pressure of the atmosphere. The tables on each subject are illustrated by diagrams representing to the eye variations in the given condition from month to month through the year, at the several localities represented.

These tables give not only the meteorological conditions for the year and month under consideration, but they also contain, for purposes of comparison, statements of the average conditions for the longest period available in each case.

In the latter part of the Annual Report volume for 1886, there was published an article on "The Causation of Pneumonia," in which extensive use was made of meteorological statistics, especially those relating to the meteorology of Michigan. In the Annual Report for 1887, in an article on "The Causation of the Cold-weather Diseases," influenza, tonsillitis, bronchitis.

scarlet fever, diphtheria, and small-pox are proved to sustain very close relations to meteorological conditions. Extensive use of meteorological and sickness statistics is made in the Report for 1887, in an article entitled "The Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-passages." In the Report for 1891, "Abstract of Proceedings, April 14, 1891," in a discussion on the subject of "The Causation of Influenza," is an important use of the meteorological data, with diagrams and other evidence, showing how closely influenza is associated with atmospheric temperature, humidity, ozone, and wind. In the Report for 1891, page cxxvii, is an article entitled "Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-passages in Colorado," in which are also data relative to other States and countries. In the Report for 1894, pages clix-ccxiv, is a paper on "The Causation of Influenza and Allied Diseases with Suggestions for their Prevention," in which important use is made of the meteorological data collected in Michigan since 1877. In each of the Annual Reports of this Board since that for the year 1877 considerable use has been made of the sickness statistics in Michigan for the complete study of which, data of the meteorological conditions coincident with the sickness is required.

EXHIBIT I.—Names of observers whose reports are summarized in the following Meteorological Tables and Diagrams, their places of observation, and the counties and geographical divisions of the State in which these places are situated, and months for which reports were received from each observer.

Name of Observer.	Place of Observation.	County.	Division of the State.*	Months (inclusive) for which Registers were Received.
W. C. Gates, M. D.	Rockland	Ontonagon ..	U. P.	January to December.
H. R. Patrick, Observer, U. S. Weather Bureau.....	Marquette.....	Marquette...	U. P.	January to December.
C. L. Bozzell, Observer, U. S. Weather Bureau.....	Sault Ste. Marie..	Chippewa....	U. P.	January to December.
S. F. Wait.....	Traverse City.....	G'd Traverse..	N. W.	January to December.
H. McP. Baldwin, Observer, U. S. Weather Bureau.....	Alpena.....	Alpena.....	N. E.	January to December.
D. W. Mitchell, M. D.....	Harrisville.....	Alcona.....	N. E.	January to December.
Geo. W. Felger, Observer, U. S. Weather Bureau.....	Grand Haven.....	Ottawa.....	W.	January to December.
Wm. M. Edmondson, Observer, U. S. Weather Bureau.....	Port Huron.....	St. Clair.....	B. & E.	January to December.
John S. Caulkins, M. D.....	Thornville.....	Lapeer.....	B. & E.	January to December.
Prof R. C. Kedzie.....	Agr'l College.....	Ingham.....	C.	January to December.
Thos. S. Ainge.....	Office State B'd of Health, Lansing..	Ingham.....	C.	January to December.
C. E. Beers.....	Adrian	Lenawee.....	S. C.	January to June.
Asaph Hall, Jr., Director, Detroit Observatory.....	Ann Arbor.....	Washtenaw..	S. C.	January to December.
J. H. Kellogg, M. D.....	Battle Creek.....	Calhoun.....	S. C.	January to December.
Lewis Marvill.....	Parkville.....	St. Joseph...	S. C.	January to December.
C. C. Tefft.....	Tecumseh.....	Lenawee.....	S. C.	January to December.
S. Alexander.....	Birmingham	Oakland.....	S. E.	January to December.
Norman B. Conger, Inspector, U. S. Weather Bureau.....	Detroit.....	Wayne.....	S. E.	January to December.

* The counties in each division are stated in Exhibit I, on a subsequent page, in next article.

The article in this Annual Report relative to "Causes of Diseases," based upon weekly reports of sickness in Michigan, may well be studied in connection with this article, the main purpose of which is to serve as a basis for studies of the causes of diseases.

It is believed that there is nowhere else so complete a statement of the facts relating to meteorology of Michigan as is here presented, for any use for which such knowledge may be needed, now or hereafter.

EXHIBIT 2.—*Latitude and Longitude, Elevation above Sea Level, and the Average Temperature, and Average Barometric Pressure in 1897, at Meteorological Stations in Michigan,—the names of the Stations being arranged in order by latitude, highest first.*

Localities in order of Latitude, those farthest North, first.	Latitude North.	Longitude West from Greenwich.	Altitude (Approximate) above Sea Level.—Feet.	Height of Mercury in Cistern of Barometer above Sea Level.—Feet.	Average Temperature, 1897. Degrees Fahr.	Average Atmospheric Pressure, 1897. Inches of Mercury corrected for Temp.
Rockland.....			1,190.34		41.15	28.676
Marquette.....	46°34'	87°24'	669.			
Sault Ste. Marie.....	46°28'	84°22'	642.			
Alpena.....	45°5'	83°3'	587.			
Traverse City.....	44°45'	85°40'	598.	605.	45.16	29.316
Harrisville.....	43°40'	83°30'	616.		43.76	29.331
Grand Haven.....	43°5'	86°18'	590.			
Port Huron.....	43°0'	82°26'	602.			
Thornville.....	* 42°55'	* 83°10'	§ 975.	§ 980.	47.89	28.979
Agricultural College.....	42°44'	84°29'	820.	834.	47.01	29.104
Lansing, S. B. of H.....	† 42°44'	† 84°33'	¶ 900.	917.	47.82	29.081
Birmingham.....	42°30'	83°10'	‡ 752.		48.47	29.096
Detroit.....	42°20'	83°3'	585.	730.		
Battle Creek.....	42°20'	85°11'	800.		49.26	28.944
Ann Arbor.....	42°17'	83°44'	930.	936.	47.86	29.049
Tecumseh.....	* 43°1'	* 83°57'	835.	840.	47.29	29.151
Adrian.....	41°53'	84°11'	770.			

* Estimated from lines on a map of Michigan, issued by the General Land Office, Department of the Interior, 1878. For stations having no reference mark, the latitude and longitude were stated by the observer on the meteorological reports received.

† The exact latitude and longitude of the astronomical post placed in the ground near the new Capitol at Lansing, by the U. S. Lake Survey in 1875, as determined by the observations then made, is 42°43' 53.11" N. and 84°33' 19.68" W.

‡ Estimated from data on "Railroad Profiles," pages 179-187, Annual Report of the State Board of Health for 1878.

§ Estimated from data in Tackabury's Atlas of the State of Michigan.

¶ Estimated from comparisons of the barometrical observations at Lansing, Port Huron, and Grand Haven for the four years, 1879-82.

NOTE—Green's standard barometer was used at the above stations for the year 1897.

EXHIBIT 3.—Average Temperature by Year and Months, for each of the Years 1882-97, and the Average for the 20 Years, 1877-96. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 20 Yrs., '77-96	46.33	21.42	23.30	29.74	44.89	56.35	66.55	70.78	68.19	61.41	49.06	36.17	28.11
1882-----	47.14	24.32	33.42	34.12	42.65	51.04	64.43	67.84	69.05	61.71	53.53	37.90	25.72
1883-----	43.52	15.78	20.03	24.63	43.00	51.37	64.73	68.36	65.41	57.24	46.73	38.10	26.89
1884-----	44.72	15.14	20.94	28.78	42.00	54.38	67.04	66.70	66.10	64.72	51.56	34.53	24.77
1885-----	42.36	15.46	10.21	19.51	41.39	53.32	63.39	71.13	63.23	59.14	45.78	38.14	27.59
1886-----	44.82	18.72	21.18	30.10	46.04	54.69	63.31	68.68	67.36	61.15	51.84	34.32	20.44
1887-----	44.82	16.58	21.57	25.55	42.09	60.68	66.53	73.22	66.41	57.95	44.46	35.18	25.57
1888-----	45.03	15.93	21.65	25.89	42.81	53.40	68.03	70.95	68.05	58.20	46.01	38.73	30.70
1889-----	47.36	28.18	18.57	35.83	46.04	56.74	63.05	70.69	68.58	61.36	44.59	37.95	36.76
1890-----	46.99	30.06	30.07	27.47	45.23	52.41	69.93	71.29	65.28	58.06	48.88	38.60	26.65
1891-----	47.61	26.90	27.33	28.93	47.11	55.40	67.62	66.67	68.16	65.50	49.01	34.57	34.11
1892-----	45.33	18.72	26.26	28.44	42.50	53.73	66.79	70.87	68.91	61.33	48.87	33.61	24.16
1893-----	54.64	15.23	20.09	30.61	43.19	54.30	69.05	72.16	68.57	60.40	50.59	36.61	26.88
1894-----	48.49	27.19	22.37	38.70	46.90	55.24	70.37	73.30	68.74	64.45	50.14	33.09	31.40
1895-----	46.37	19.04	17.27	27.39	47.23	59.49	70.60	70.10	70.11	65.92	44.54	36.03	28.68
1896-----	47.89	24.88	24.57	28.11	51.33	64.77	68.12	71.02	69.61	58.57	45.80	38.70	29.24
1897-----	46.57	22.40	25.64	31.86	43.93	53.55	63.07	73.28	65.59	64.22	53.45	36.06	25.75

EXHIBIT 4.—Average Temperature by Year and Months, for each of the Years 1880-97, and the Average for the 18 Years, 1879-96, at the Office of the State Board of Health, State Capitol, Lansing, Michigan.

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 18 Yrs., '79-96	47.80	22.19	23.96	31.17	46.57	58.27	68.26	71.93	68.71	61.73	49.55	36.68	28.60
1880-----	48.94	36.81	31.62	34.19	47.46	65.48	69.44	71.69	70.38	61.19	48.64	28.78	21.65
1881-----	49.59	16.98	22.27	30.59	43.23	66.94	65.99	75.41	74.63	71.33	53.63	38.78	35.28
1882-----	49.23	25.65	35.88	36.14	44.83	53.10	66.86	72.57	71.34	63.64	55.63	39.00	26.13
1883-----	45.69	17.01	22.07	28.04	46.42	58.28	66.98	70.42	67.78	59.42	48.31	40.09	28.47
1884-----	47.43	16.48	23.89	32.26	45.30	58.20	70.69	69.77	68.58	67.99	53.47	36.51	26.01
1885-----	43.01	15.85	10.49	21.57	43.97	55.71	65.26	73.35	63.28	55.86	45.43	38.21	27.14
1886-----	46.19	19.02	22.44	32.09	50.16	57.77	66.20	70.87	68.49	61.81	51.78	34.02	19.61
1887-----	46.69	18.26	24.39	27.81	45.27	64.24	69.44	75.76	67.06	58.66	45.19	36.59	27.63
1888-----	45.49	15.63	22.38	27.49	44.30	53.91	68.80	71.09	67.77	57.79	46.32	39.16	31.19
1889-----	47.65	29.00	18.89	36.81	46.91	56.99	63.36	70.59	68.46	61.32	44.39	37.71	37.31
1890-----	47.89	31.63	31.51	28.53	46.86	53.94	71.03	71.81	65.38	57.97	49.09	39.46	27.46
1891-----	48.27	27.74	29.13	29.59	48.12	56.01	68.27	66.84	68.20	65.87	49.39	34.80	35.28
1892-----	46.33	19.94	27.91	30.15	44.68	54.91	68.22	71.41	68.59	61.43	49.27	34.11	25.34
1893-----	46.03	15.09	20.68	32.19	43.98	55.20	69.14	72.14	68.47	60.22	51.19	36.40	27.70
1894-----	49.00	28.56	22.70	40.48	47.77	56.20	71.04	73.59	67.84	64.21	50.39	33.41	31.78
1895-----	46.74	18.91	16.98	27.92	48.66	60.52	71.56	70.35	70.20	65.88	44.44	35.86	29.55
1896-----	48.31	25.01	24.43	28.89	52.71	65.63	68.74	71.28	69.72	65.60	45.81	39.07	29.91
1897-----	47.82	23.74	26.85	33.52	45.06	55.30	65.53	74.32	66.19	64.53	54.31	37.52	26.98

EXHIBIT 5.—Average Temperature by Year and Months, for each of the Years 1864-97, and the Average for the 33 Years, 1864-96, at the Agricultural College, Michigan.

Years, etc.	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 33 Yrs., '64-96	46.56	21.85	23.61	30.85	46.05	58.03	67.88	71.33	68.67	60.52	51.06	35.49	26.59
1864.....	47.32	22.26	27.32	31.74	45.86	60.19	67.62	74.52	70.72	59.62	45.74	37.88	24.27
1865.....	48.12	21.10	27.59	39.96	47.40	57.65	70.76	65.60	65.84	67.66	46.50	38.63	27.72
1866.....	45.60	21.16	22.71	29.60	48.94	55.04	66.60	71.72	62.60	55.80	49.50	37.94	25.53
1867.....	46.91	17.61	30.89	29.72	48.20	51.11	71.61	71.60	69.78	56.60	50.60	40.44	25.31
1868.....	46.34	19.00	18.72	37.80	43.68	59.08	68.46	77.19	70.33	58.77	45.19	36.77	24.16
1869.....	46.27	29.38	26.66	27.60	45.70	56.02	64.45	70.35	70.58	63.45	40.80	32.05	28.16
1870.....	49.11	25.37	24.25	30.28	50.39	64.32	70.87	74.40	70.11	63.66	52.45	38.40	24.80
1871.....	47.93	24.75	25.65	38.18	50.13	61.39	68.21	70.60	71.19	58.10	53.91	31.95	21.12
1872.....	45.54	21.59	21.34	24.75	47.39	58.48	71.82	74.91	71.22	62.03	47.44	29.80	15.74
1873.....	44.54	15.87	19.10	28.30	43.17	56.98	70.60	70.82	69.49	57.38	44.68	28.49	29.54
1874.....	47.05	27.70	25.51	32.30	36.87	59.58	70.61	70.02	69.39	62.85	49.10	35.00	26.96
1875.....	43.06	12.87	7.99	26.20	41.11	60.82	66.57	69.67	65.48	58.50	42.93	32.96	31.58
1876.....	46.17	30.22	27.38	30.55	44.16	57.95	68.14	72.48	71.55	56.30	43.74	36.33	15.23
1877.....	47.42	18.07	32.31	24.51	46.16	58.25	65.93	71.43	68.46	61.28	50.83	35.24	36.57
1878.....	48.29	29.11	28.07	40.90	50.55	54.57	64.08	73.04	70.15	63.15	48.33	36.29	21.29
1879.....	46.88	19.19	20.40	33.19	44.84	58.76	66.02	74.03	70.00	56.21	57.28	38.22	27.46
1880.....	47.32	37.10	29.19	35.50	45.87	64.30	67.60	68.04	68.58	55.83	46.23	27.52	22.07
1881.....	48.73	16.95	21.58	30.28	45.59	65.24	64.31	73.43	72.69	69.69	52.51	38.20	34.31
1882.....	47.57	24.89	35.12	35.96	44.70	52.73	66.49	67.71	69.52	59.98	52.67	36.30	24.80
1883.....	43.52	14.39	19.76	24.89	43.48	52.98	65.87	68.94	64.90	56.43	46.17	38.08	26.39
1884.....	45.66	15.46	23.43	29.89	43.66	56.90	68.92	67.95	66.91	65.06	50.91	34.11	24.71
1885.....	42.90	15.34	8.94	21.26	43.59	55.76	64.69	72.70	63.62	58.94	44.95	37.22	27.75
1886.....	46.20	18.78	22.27	31.33	50.18	58.06	65.72	70.68	69.30	62.07	52.37	33.94	19.74
1887.....	46.60	18.20	24.26	28.29	45.37	64.28	68.53	75.51	67.96	58.86	44.97	35.66	27.30
1888.....	45.03	15.40	21.95	27.03	44.03	53.65	67.89	70.53	67.55	57.76	45.70	38.50	30.39
1889.....	47.33	28.04	18.25	36.51	46.59	57.37	62.83	70.19	68.56	61.24	44.19	37.39	36.75
1890.....	47.60	31.54	31.54	28.15	47.08	53.69	70.40	71.04	65.42	57.76	49.11	39.06	26.45
1891.....	47.38	26.70	26.60	29.30	47.40	55.70	67.40	65.30	67.90	65.10	48.80	33.90	34.50
1892.....	45.88	19.19	27.30	29.86	44.50	54.50	67.70	70.29	68.30	60.80	48.30	34.20	25.59
1893.....	44.98	14.80	21.31	28.16	43.50	54.40	66.60	71.50	68.10	58.41	49.70	35.63	27.60
1894.....	48.58	26.88	21.15	40.06	48.44	56.94	71.38	73.22	68.80	63.66	49.80	32.48	30.12
1895.....	46.67	17.50	16.40	27.20	48.57	61.80	71.40	70.50	71.20	66.60	45.00	35.40	28.50
1896.....	47.99	24.65	24.28	28.70	52.64	66.48	69.87	71.83	69.97	57.62	44.61	37.09	28.13
1897.....	47.01	22.34	26.38	33.00	44.58	55.79	64.21	73.79	65.94	62.92	53.06	36.49	25.62

EXHIBIT 6.—*Statements of Meteorological Conditions in the year and in each month of the year 1897, compared with the annual and monthly averages for 1896, and for several stated periods of years. These statements and averages are for Groups of Several Stations in Michigan.*

Meteorological Conditions.	1897 Compared with Averages for Previous Years.		In 1897 More (+), or Less (—), than in 1896.	Meteorological Conditions.	1897 Compared with Averages for Previous Years.		In 1897 More (+), or Less (—), than in 1896.
	No. of Years Averaged, ending with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.			No. of Years Averaged, ending with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.	
YEAR 1897.				YEAR 1897.			
Av. Temp.	20	+ .24°	—1.32°	<i>Continued.</i>			
Range of Temp.* ..	20	—3°	=	Cloudiness.....	20	+1 per ct.	+1 per ct.
Av. Monthly Range of Temp.* ..	20	=	—1	Rainfall.....	20	—2.41 in.	— .50 in.
Av. Daily Range of Temp.* ..	18	— .21°	+34°	Atmospheric Pressure.....	20	— .064 in.	— .064 in.
JANUARY.				FEBRUARY.			
Av. Temp.	20	+ .98°	—2.48°	Av. Temp.	20	+2.34°	+1.07°
Range of Temp.* ..	20	+3°	+7°	Range of Temp.* ..	20	—9°	—14°
Av. Daily Range of Temp.* ..	18	—1.38°	+2.62°	Av. Daily Range of Temp.* ..	18	—4.36°	—2.78°
Cloudiness.....	20	+7 per ct.	—1 per ct.	Cloudiness.....	20	+14 per ct.	+13 per ct.
Rainfall.....	20	+1.42 in.	+2.03 in.	Rainfall.....	20	—1.11 in.	— .6 in.
Atmospheric Pressure.....	20	— .079 in.	— .132 in.	Atmospheric Pressure.....	20	— .085 in.	+ .090 in.
MARCH.				APRIL.			
Av. Temp.	20	+2.12°	+3.75°	Av. Temp.	20	— .96°	—7.40°
Range of Temp.* ..	20	+5°	—1°	Range of Temp.* ..	20	=	—6°
Av. Daily Range of Temp.* ..	18	— .66°	+ .25°	Av. Daily Range of Temp.* ..	18	— .43°	— .65°
Cloudiness.....	20	+5 per ct.	+10 per ct.	Cloudiness.....	20	+8 per ct.	+8 per ct.
Rainfall.....	20	+ .90 in.	+1.75 in.	Rainfall.....	20	+ .16 in.	— .19 in.
Atmospheric Pressure.....	20	— .070 in.	— .086 in.	Atmospheric Pressure.....	20	— .022 in.	— .061 in.
MAY.				JUNE.			
Av. Temp.	20	—2.80°	—11.22°	Av. Temp.	20	—3.48°	—5.05°
Range of Temp.* ..	20	—4°	—3°	Range of Temp.* ..	20	+2°	+11°
Av. Daily Range of Temp.* ..	18	— .64°	—2.10°	Av. Daily Range of Temp.* ..	18	+ .06°	— .50°
Cloudiness.....	20	+2 per ct.	+11 per ct.	Cloudiness.....	20	+1 per ct.	+9 per ct.
Rainfall.....	20	+ .16 in.	+ .60 in.	Rainfall.....	20	—1.18 in.	— .63 in.
Atmospheric Pressure.....	20	— .060 in.	— .043 in.	Atmospheric Pressure.....	20	— .075 in.	— .083 in.

* By registering thermometers.

Comments on Exhibit 6 are printed on page 10.

The low temperature for May and the small amount of rainfall for September are especially noticeable.

EXHIBIT 6—CONTINUED.—*Meteorological Conditions at stations in Michigan, in months for the year 1897, compared with averages for corresponding months in preceding years.*

Meteorological Conditions.	1897 Compared with Averages for Previous Years.			Meteorological Conditions.	1897 Compared with Averages for Previous Years.		
	No. of Years Aver- aged, end'g with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.	In 1897 More (+), orLess(—), than in 1896.		No. of Years Aver- aged, end'g with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.	In 1897 More (+), orLess(—), than in 1896.
JULY.				AUGUST.			
Av. Temp.-----	20	+2.50°	+2.26°	Av. Temp.-----	20	—2.60°	—4.02°
Range of Temp.*..	20	—2°	=	Range of Temp.*..	20	—5°	—5°
Av. Daily Range of Temp.*-----	18	—1.19°	+ .39°	Av. Daily Range of Temp.*-----	18	+ .14°	+ .67°
Cloudiness-----	20	=	—8 per ct.	Cloudiness-----	20	—2 per ct.	—1 per ct.
Rainfall.....	20	+ .63 in.	.62 in.	Rainfall.....	20	— .61 in.	—1.51 in.
Atmospheric Pres- sure-----	20	— .116 in.	— .134 in.	Atmospheric Pres- sure-----	20	— .090 in.	— .105 in.
SEPTEMBER.				OCTOBER.			
Av. Temp.-----	20	+2.81°	+5.65°	Av. Temp.-----	20	+4.39°	+7.65°
Range of Temp.*..	20	+5°	+4°	Range of Temp.*..	20	+2°	+4°
Av. Daily Range of Temp.*-----	18	+3.29°	+5.08°	Av. Daily Range of Temp.*-----	18	+2.57°	+1.54°
Cloudiness-----	20	—15 per ct.	—31 per ct.	Cloudiness-----	20	—10 per ct.	—4 per ct.
Rainfall.....	20	—2.04 in.	—3.79 in.	Rainfall.....	20	— .65 in.	+ .59 in.
Atmospheric Pres- sure-----	20	+ .043 in.	+ .086 in.	Atmospheric Pres- sure-----	20	— .027 in.	— .026 in.
NOVEMBER.				DECEMBER.			
Av. Temp.-----	20	— .11°	—2.64°	Av. Temp.-----	20	—2.36°	—3.49°
Range of Temp.*..	20	+2°	=	Range of Temp.*..	20	+5°	—2°
Av. Daily Range of Temp.*-----	18	+ .07°	— .44°	Av. Daily Range of Temp.*-----	18	— .06°	+ .03°
Cloudiness-----	20	+1 per ct.	—6 per ct.	Cloudiness-----	20	+4 per ct.	—11 per ct.
Rainfall.....	20	+ .19 in.	— .06 in.	Rainfall.....	20	— .29 in.	+1.41 in.
Atmospheric Pres- sure-----	20	— .078 in.	— .102 in.	Atmospheric Pre- sure-----	20	— .107 in.	— .169 in.

* By registering thermometers.

EXHIBIT 7.—*Statements of Meteorological Conditions in the year and in each month of the year 1897, compared with annual and monthly averages for 1896, and for several stated periods of years—from observations by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Meteorological Conditions.	1897 Compared with Averages for Previous Years.		In 1897 More (+), or Less (—), than in 1896.	Meteorological Conditions.	1897 Compared with Averages for Previous Years.		In 1897 More (+), or Less (—), than in 1896.
	No. of Years Averaged, end'g with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.			No. of Years Averaged, end'g with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.	
YEAR 1897.				YEAR 1897.			
Av. Temp.	33	+ .45°	— .98°	<i>Continued.</i>			
Range of Temp.* ..	24	+4°	+1°	Cloudiness.....	33	—5 per ct.	—4 per ct.
Av. Monthly Range of Temp.* ..	24	+1°	—4°	Rainfall.....	33	+2.71 in.	—1.69 in.
Av. Daily Range of Temp.* ..	23	—7.16°	— .80°	Atmospheric Pressure.....	22	+ .039 in.	+ .057 in.
JANUARY.				FEBRUARY.			
Av. Temp.	33	+ .49°	—2.31°	Av. Temp.	33	+2.77°	+2.10°
Range of Temp.* ..	24	+12°	+13°	Range of Temp.* ..	24	—10°	—26°
Av. Daily Range of Temp.* ..	23	+3.31°	+1.17°	Av. Daily Range of Temp.* ..	23	—3.53°	—3.26°
Cloudiness.....	33	+1 per ct.	—3 per ct.	Cloudiness.....	33	+15 per ct.	+13 per ct.
Rainfall.....	33	+2.44 in.	+3.38 in.	Rainfall.....	33	—1.25 in.	— .84 in.
Atmospheric Pressure.....	22	+ .092 in.	+ .007 in.	Atmospheric Pressure.....	22	+ .015 in.	+ .174 in.
MARCH.				APRIL.			
Av. Temp.	33	+2.15°	+4.30°	Av. Temp.	33	—1.47°	—8.06°
Range of Temp.* ..	24	+4°	=	Range of Temp.* ..	24	+2°	—6°
Av. Daily Range of Temp.* ..	23	+ .36°	+ .71°	Av. Daily Range of Temp.* ..	23	—1.00°	—1.40°
Cloudiness.....	33	+4 per ct.	+13 per ct.	Cloudiness.....	33	+9 per ct.	+19 per ct.
Rainfall.....	33	— .20 in.	+ .77 in.	Rainfall.....	33	+ .35 in.	— .03 in.
Atmospheric Pressure.....	22	+ .034 in.	+ .033 in.	Atmospheric Pressure.....	22	+ .086 in.	+ .076 in.
MAY.				JUNE.			
Av. Temp.	33	—2.24°	— .69°	Av. Temp.	33	—3.67°	—5.66°
Range of Temp.* ..	24	—4°	—1°	Range of Temp.* ..	24	+6°	+4°
Av. Daily Range of Temp.* ..	23	+2.67°	— .12°	Av. Daily Range of Temp.* ..	23	+4.11°	— .26°
Cloudiness.....	33	—2 per ct.	+8 per ct.	Cloudiness.....	33	+3 per ct.	+8 per ct.
Rainfall.....	33	+ .06 in.	+ .15 in.	Rainfall.....	33	—1.29 in.	— .03 in.
Atmospheric Pressure.....	22	+ .044 in.	+ .054 in.	Atmospheric Pressure.....	22	— .009 in.	— .010 in.

* By registering thermometers.

Comments on Exhibit 7 are printed on page 10.

The low temperature for June, and the large amount of rainfall for July, are especially noticeable.

EXHIBIT 7—CONTINUED.—*Meteorological Conditions at the Agricultural College in months, for the year 1897, compared with averages for corresponding months in preceding years.*

Meteorological Conditions.	1897 Compared with Averages for Previous Years.		In 1897 More (+), orLess(—), than in 1896.	Meteorological Conditions.	1897 Compared with Averages for Previous Years.		In 1897 More (+), orLess(—), than in 1896.
	No. of Years Aver- aged, end'g with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.			No. of Years Aver- aged, end'g with 1896.	More (+), or Less (—), in 1897 than the Average for Previous Years.	
JULY.				AUGUST.			
Av. Temp.-----	33	+2.46°	+1.96°	Av. Temp.-----	33	—2.73°	—4.03°
Range of Temp.*--	24	+1°	—6°	Range of Temp.*--	24	—5°	—9°
Av. Daily Range of Temp.*-----	23	+3.02°	+4.19°	Av. Daily Range of Temp.*-----	23	+2.80°	+1.67°
Cloudiness-----	33	—12 per ct.	—21 per ct.	Cloudiness-----	33	—16 per ct.	—16 per ct.
Rainfall-----	33	+5.38 in.	+1.76 in.	Rainfall-----	33	—1.14 in.	—3.04 in.
Atmospheric Pres- sure-----	22	— .064 in.	— .053 in.	Atmospheric Pres- sure-----	22	— .030 in.	— .021 in.
SEPTEMBER.				OCTOBER.			
Av. Temp.-----	33	+2.49°	+5.30°	Av. Temp.-----	33	+2.00°	+8.45°
Range of Temp.*--	24	+8°	+2°	Range of Temp.*--	24	+2°	+1°
Av. Daily Range of Temp.*-----	23	+5.62°	+6.10°	Av. Daily Range of Temp.*-----	23	+4.99°	— .23°
Cloudiness-----	33	—28 per ct.	—41 per ct.	Cloudiness-----	33	—27 per ct.	—12 per ct.
Rainfall-----	33	—2.05 in.	—5.93 in.	Rainfall-----	33	— .27 in.	+1.09 in.
Atmospheric Pres- sure-----	22	+ .141 in.	+ .203 in.	Atmospheric Pres- sure-----	22	+ .138 in.	+1.37 in.
NOVEMBER.				DECEMBER.			
Av. Temp.-----	33	+1.00°	— .60°	Av. Temp.-----	33	— .97°	—2.51°
Range of Temp.*--	24	—6°	—11°	Range of Temp.*--	24	+10°	—7°
Av. Daily Range of Temp.*-----	23	+ .29°	+ .14°	Av. Daily Range of Temp.*-----	23	+ .13°	+ .86°
Cloudiness-----	33	+6 per ct.	+2 per ct.	Cloudiness-----	33	—2 per ct.	—2 per ct.
Rainfall-----	33	+ .61 in.	— .19 in.	Rainfall-----	33	+ .07 in.	+1.22 in.
Atmospheric Pres- sure-----	22	+ .062 in.	+ .042 in.	Atmospheric Pres- sure-----	22	+010 in.	+ .048 in.

* By registering thermometers.

METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1897 IN MICHIGAN.

At the several meteorological stations, in different parts of the State, the average temperature for 1897 was $.24^{\circ}$ higher than the average for the preceding 20 years; the annual range of temperature was the same as in 1896, and 3° less than the annual range for the preceding 20 years; the average monthly range of temperature was 1° less than in 1896, and the same as the average for the preceding 20 years. The average daily range of temperature was $.34^{\circ}$ more than in 1896, and $.21^{\circ}$ less than the average for the preceding 18 years; the average cloudiness was 1 per cent greater than in 1896, and 1 per cent greater than the average for the preceding 20 years; the rainfall (rain and melted snow) was .50 of an inch less than in 1896, and 2.41 inches less than the average for the preceding 20 years; the average atmospheric pressure was .064 of an inch less than in 1896, and .064 of an inch less than the average for the preceding 20 years.

In Exhibit 6, is given by year and months, a comparison of conditions in 1897, in Michigan, with those in 1896, and with the averages of periods of years. Naming the months in order of greatest difference, October, September, July, February, March and January, were months in which the average temperature in 1897 was higher than the average for corresponding months in the preceding 20 years; June, May, August, December, April and November were months in which the average temperature in 1897 was lower than the average for corresponding months in the preceding 20 years.

METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1897 AT ONE CENTRAL STATION.

At the State Agricultural College, near Lansing, and near the center of the thickly-settled part of the State, the average temperature for 1897 was $.98^{\circ}$ lower than in 1896, and $.45^{\circ}$ higher than the average for the preceding 33 years; the annual range of temperature was 1° greater than in 1896, and 4° greater than the average for the preceding 24 years; the average monthly range of temperature was 4° less than in 1896, and 1° greater than the average for the preceding 24 years; the average daily range of temperature was $.80^{\circ}$ less than in 1896, and 7.16° less than the average for the preceding 23 years; the average cloudiness was 4 per cent less than in 1896, and 5 per cent less than the average for the preceding 33 years; the rainfall (rain and melted snow) was 1.69 inches less than in 1896, and 2.71 inches greater than the average for the preceding 33 years; the average atmospheric pressure was .057 of an inch greater than in 1896, and .039 of an inch less than the average for the preceding 22 years.

In Exhibit 7, is given by year and months, a comparison of conditions in 1897, at the Agricultural College, with those in 1896, and with averages for periods of years. Naming the months in the order of greatest difference, February, July, September, March, October, November and January, were months in which the average temperature in 1897 was higher than the average for corresponding months in the preceding 33 years; June, August, May, April and December were months in which the average temperature in 1897 was lower than the average for corresponding months in the preceding 33 years, at that station, which is near the central part of the State.

Whoever will carefully study Diagram 1. in this article, and in similar articles for preceding years, will see that thermometers and methods of observation have become so perfect that, given a curve representing correctly the

temperature by months at one station in Michigan, curves can readily be constructed without actual records, which will somewhat closely represent the temperature at each of several other stations, because the curves for many stations run so nearly parallel that all that is necessary to do is to find the average difference of mean annual temperature at the station to be represented compared with the station for which the data are given. It may also be seen that a curve representing the temperature at a station in the central part of the State very closely resembles the curve representing the average for many stations representing nearly all parts of the State. This proves that the practice adopted many years ago of stating the meteorological characteristics at one central station is a reasonably safe practice, and it is especially useful when it enables us to gain a comparison for a longer period than can be made from records at many stations, and also when employed in advance of the receipt of records from all stations, as is the case when the weekly bulletins of "Health in Michigan" are issued, for the purposes for which the meteorological conditions at the State Capitol are used to represent the conditions probably prevailing throughout the State.

LOCAL METEOROLOGICAL PHENOMENA IN THE SEVERAL MONTHS OF THE YEAR 1897.

The following general remarks relative to temperature, frosts, effects on vegetation, migration of birds, etc., in 1897, are taken from the monthly reports by observers. The names of stations are appended; the names of observers are stated in Exhibit 1.

JANUARY.

Depth of snow on ground 2.3 inches, Jan. 15; 8.2 inches, Jan. 31.—*Marquette*.
Melting snow on ground, Jan. 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. Lake Huron a field of ice as far as the eye can reach, Jan. 29.—*Port Huron*.
January was a cold winter month with considerable snow, but not much sleighing. Ice on lakes is not very thick—perhaps 8 inches.—*Thornville*.
Depth of snow on ground, 1 inch, Jan. 15; 10 inches, Jan. 31.—*Adrian*.
Bees were out, Jan. 1.—*Parkville*.
Frost out of ground, Jan. 1. Frost, Jan. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. Sleighing, Jan. 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. Depth of snow on ground, a little in patches, Jan. 15; about 6 inches, Jan. 31. Grand River closed, second time of season, Jan. 22.—*Lansing*.

FEBRUARY.

Melting snow on ground during the entire month. Black River and Lake Huron frozen, during month. St. Clair River full of floating ice.—*Port Huron*.
No thunder and lightning observed or other unusual phenomena. A winter month with little very cold weather—not going below zero. Sleighing after the 11th. Ice on the seven ponds about 10 inches thick at the close of the month. Frost in the ground in the open, about the same, in the woods very little. Ground not well covered with snow; roads badly drifted.—*Thornville*.
Frost, Feb. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28. Sleighing, Feb. 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 15, 16. Depth of snow on ground, 6½ inches, Feb. 15; a little in patches Feb. 28.—*Lansing*.

MARCH.

Depth of snow on ground, 30.6 inches, Mar. 15; .8 inch, Mar. 31.—*Marquette*.
Ice in Black River broke, and moved out into St. Clair River, Mar. 10. Ice in St. Clair River began moving, at Marine City, during the day. Navigation opened on St. Clair River, March 24. Navigation opened on Lake Huron, Mar. 27. Melting snow on ground, Mar. 1, 2, 3, 4, 5, 6, 14, 15, 16, 17, 23, 24, 25, 26, 27, 28.—*Port Huron*.
Did not freeze at night, Mar. 9, 17, 18, 19. First robin seen, Mar. 10; blackbirds, 28; chewink and song sparrow, Mar. 29. A windy, stormy month of about average temperature for the season. No frost in the ground at close, nor ice in the seven ponds.—*Thornville*.
Bees were out nearly every day after Mar. 9. Wild geese observed, Mar. 5; frogs, Mar. 10; robins, Mar. 17.—*Parkville*.
Killing frost, Mar. 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 24, 25, 26, 27, 28, 31. Light frost, Mar. 23, 29. Sleighing, Mar. 3, 4. Frost out of ground, Mar. 21; froze again, Mar. 24; out again, Mar. 29. Robins heard, Mar. 8. Bluebird, song sparrow and blackbird, Mar. 11. Ice began moving in Grand River, Mar. 9; river open Mar. 11. Killdeer, meadow lark and phoebe birds, Mar. 21. Lilacs budding, Mar. 18; shad bush, soft maple and pussy willow, Mar. 20. Frogs heard, Mar. 29. Depth of snow on ground, immeasurable, a little in patches. No snow, Mar. 31.—*Lansing*.

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APRIL.

Opening of navigation, Apr. 20. Depth of snow on ground, trace, Apr. 15; none, Apr. 30.—*Marquette*.
 Martins arrive, Apr. 25; ice on Grand Traverse Bay goes out, Apr. 3.—*Traverse City*.
 A cold, backward month; last freeze, Apr. 26.—*Thornville*.
 Frost, Apr. 12, 15, 20, 27.—*Battle Creek*.
 Ice formed, Apr. 8, 10, 11, 12, 15, 17, 18, 19, 20, 21, 27. Total precipitation, 2.87 inches, which is .94 of an inch below the normal for 18 years.—*Parkville*.
 Light frost, Apr. 2, 8, 9. Killing frost, Apr. 3, 10, 11, 12, 16, 17, 18, 19, 20, 21. Ice formed, Apr. 27.
 Ground froze, Apr. 19, 27. No snow on ground, Apr. 15, 30. Bees seen, first time of season, Apr. 14.
 Apple trees budding, Apr. 14. Soft maple in blossom, Apr. 14. Dandelions in bloom, Apr. 27. Flies appear, Apr. 22. Bobolinks seen, Apr. 23; yellow birds, Apr. 25; oriole, Apr. 28; swallows, Apr. 29.—*Lansing*.

MAY.

Light frost, May 2, 15, 21, 22, 25, 26. Killing frost, May 10, 16.—*Sault Ste. Marie*.
 Wild geese flying north, May 5. Frosts, May 14, 24, 25.—*Traverse City*.
 Light frost, May 22; killing frost, May 25.—*Alpena*.
 Light frost, May 16, 22, 25, 26. Heavy frost, May 15.—*Grand Haven*.
 Light frost, May 8, 27. Heavy frosts, May 22, 26, 31.—*Port Huron*.
 Cowslips in blossom, May 2; mandrakes coming up, May 3; juneberry in blossom, May 6; plums, peaches and cherries in blossom, May 13; apples, May 17; yellow oak leafing, May 21; white oak leafing, May 24. May was cold and wet, with over 5 inches of precipitation. The season is backward and as the month closes scarcely any corn is up. The cold wet weather, however, has been very favorable for the wheat, which looked very poorly when the spring opened. It would be a moderate estimate to say that the present prospect for the crop is twenty-five per cent better than it was when the month began. The meadows are not doing so well as they promised at first; it has been so very cold and wet that the sorrel is outgrowing the grass. Oats are doing fairly well and so is rye. The season is backward. Wheat did not head out in May, as it did last year. The season is at least two weeks later than last.—*Thornville*.
 Frost, May 16, 25.—*Battle Creek*.
 Frost, May 5, 15, 16, 17, 22, 25, 26, 31.—*Parkville*.
 Light frost, May 26, 27. Heavy frost, May 31.—*Detroit*.
 Light frost, May 15, 21, 25. Horse chestnut, lilac, crab apple, in leaf, May 8; soft maple, May 10; apple, May 13; hard maple and elm, May 20. Flowering currant in bloom, May 2; shad bush and cherry, May 5; plum and apricot, May 6; pear, May 9; white thorn, May 10; crab apple, May 13; lilac, May 19. Brown thrush heard, May 4; butterflies seen, May 9; capitol lawn mowed, first time of season, May 4.—*Lansing*.

JUNE.

Frost, June 7, 8, 9, 21.—*Sault Ste. Marie*.
 Light Frost, June 8. Killing frost, June 9.—*Alpena*.
 Wheat heading out, June 8. Light frost, June 21. Haying began, June 28. A cool month for season, the nights, especially, but warming up into corn weather as it closes.—*Thornville*.
 Light frost, June 9.—*Detroit*.
 Frost, June 8, 21, no damage. 1.97 inches of precipitation for June, is 2.08 inches below the normal for 18 years.—*Parkville*.

JULY.

Oats heading out, July 1. Wheat harvest began, July 22. A hot month, about three degrees above the average for us; the June drought was not broken till the 10th; after that plenty of rain fell, and the temperature was more endurable. The drought and great heat were disastrous to the oats, drying them up and ripening them prematurely, and hurtful to potatoes, making them come up late; this remark to a less extent is true applied to corn and beans. We shall have to be favored with a late frost if these crops come to maturity unhurt.—*Thornville*.
 3.95 inches of precipitation for July is 0.31 of an inch below the normal for 18 years; the greatest monthly precipitation was 10.93 inches in July, 1889, and the least monthly precipitation was 0.43 of an inch in July, 1890; normal for 18 years, 4.26 inches.—*Parkville*.
 Katydids heard, first time of season, July 28.—*Lansing*.

AUGUST.

Light frost, Aug. 19, 20.—*Alpena*.
 August was a dry month and cool, especially the nights, not favorable for the growth of corn, which is late and promises poorly.—*Thornville*.
 Light frost, Aug. 20. 1.25 inches of precipitation for August is 2.03 inches below the normal for 18 years; the notable feature of the month has been its low temperature, which is the lowest in 18 years.—*Parkville*.

SEPTEMBER.

Light frost, Sept. 20, 27.—*Marquette*.
 Killing frost, Sept. 20, 21, 27.—*Sault Ste. Marie*.
 Killing frost, Sept. 21, 28.—*Alpena*.
 Light frost, first of season, Sept. 18. Heavy frost, first of season, Sept. 21.—*Port Huron*.
 Killing frost, Sept. 21. Light frosts, Sept. 20, 24, 28. September was a dry, almost cloudless month. Owing to the severe drought wheat sowing is late, and some is not up as the month closes. Water is very low. It is the poorest year for pasturage ever known in the fall. You may say for a fall drought, it is the worst known since the year Chicago burnt.—*Thornville*.
 Light frost, Sept. 20. Heavy frost, Sept. 21.—*Battle Creek*.
 Light frost, Sept. 18, 20. Heavy frost, Sept. 21.—*Detroit*.
 Light frost, Sept. 18, 20, 27, 28. Killing frost, Sept. 21. .73 of an inch of precipitation for Sept. is the least for 18 years and is below the normal, while the greatest amount during any Sept. was 8.11 inches in 1886; normal, 3.44 inches. Everything is parched and burnt up by the heat. Wheat not all sowed yet, and very little that is sowed is up out of the ground.—*Parkville*.
 Frost, first of season, Sept. 20. Light frosts, Sept. 20, 27. Killing frosts, ice formed, Sept. 21, 28.—*Lansing*.

OCTOBER.

Heavy frost, Oct. 9, 10, 13, 17, 29, 31.—*Grand Haven*.
Heavy frost, Oct. 8, 10, 13. First killing frost, Oct. 18. Forest fires during early part of month.—*Port Huron*.

The month was dry and warmer than the average; very favorable for most kinds of work: too dry for husking corn. On account of the dry weather wheat has come up very spotted, except fallowed wheat,—that is quite even with quite a good top. The light rains have not broken the drought, but have been sufficient to make the wheat grow. It is dry, under.—*Thornville*.

Light frost, Oct. 17, 25.—*Battle Creek*.

Heavy frost, Oct. 17, 18.—*Detroit*.

Light frost, Oct. 9, 17, 25. Wild geese seen, Oct. 30. 2.29 inches of precipitation for Oct. is 1.17 inches below the normal for 18 years.—*Parkville*.

Light frost, Oct. 9, 10, 13, 18, 31. Killing frosts, Oct. 17, 25. The average temperature for Oct. was 4.74° above the normal (18 years, 1879-96).—*Lansing*.

NOVEMBER.

Depth of snow on ground, 0, Nov. 15; 3.6 inches Nov. 30.—*Marquette*.

First snow of season, Nov. 6. First ice of season, Nov. 7. Melting snow on ground, Nov. 22, 23, 24.—*Port Huron*.

Did not freeze at night, Nov. 1, 8, 15, 20. First snow storm, Nov. 22. The month was quite favorable for work and growth of wheat, having kept open till near the end, with a good rainfall. The present outlook for wheat on the ground is favorable, better than was at first thought possible considering how late much of it was sowed.—*Thornville*.

Killing frost, Nov. 3.—*Detroit*.

Bees out, Nov. 20. Light frosts, Nov. 19, 21, 22. Heavy frosts, Nov. 12, 13, 17, 18, 23, 24, 29, 30.—*Parkville*.

Light frost, Nov. 3, 4, 6, 20. Killing frosts, Nov. 7, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30. Dandelions in bloom, Nov. 15. Wild geese flying south, Nov. 2. First snow of season, Nov. 11. Ground froze, Nov. 11, 12, 16, 22, 27. Grand River frozen over in places, first time of season, Nov. 30. Depth of snow on ground, 0, Nov. 15; 1 inch, Nov. 30.—*Lansing*.

DECEMBER.

Navigation closed, Dec. 25. Snow on ground, Dec. 1, 2, 3, 4, 5, 6, 7, 8, 9, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31.—*Port Huron*.

Did not freeze at night, Dec. 9, 10, 13, 14. An average winter month, with considerable snowfall, but no sleighing. Ice on the ponds at close about 8 inches: snow, 4 inches.—*Thornville*.

Total precipitation for the month, 2.73 inches, is 1.13 inches below the normal for 18 years. Total precipitation for the year, 26.98 inches, which is 4.78 inches below the normal for 18 years.—*Parkville*.

Killing frost, Dec. 1, 2, 3, 4, 5, 6, 7, 8, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. Light frost, Dec. 9, 13. Grand River closed, first time of season, Dec. 3; opened, Dec. 10; closed, Dec. 18. Frost out of ground, Dec. 10. Ground frozen, Dec. 16. First sleighing of season, Dec. 5, 6, 7, 17, 18, 19, 20, 21, 22, 23. Depth of snow on ground, 0, Dec. 15; two inches, Dec. 31.—*Lansing*.

Inches of Rainfall (Rain and Melted Snow) by Year and Months, 1891-97, at Rockland, Michigan. W. C. Gates, M. D., Observer.

Years.	Inches of Rain and Melted Snow.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Averages.....	* 26.33	2.57	1.63	1.54	2.23	3.68	2.79	2.12	2.01	2.10	3.55	2.49	2.22
1891.....	24.11	2.63	2.70	2.15	0.82	0.26	2.47	1.31	1.85	1.55	2.51	2.76	3.10
1892.....	+ 26.30			1.17	1.72	4.28	2.39	3.80	3.90	2.08	4.01	2.45	0.50
1893.....	‡ 19.17			1.40			2.58	2.91	2.45	1.55	2.98	0.80	4.50
1894.....	¶ 31.38	0.80		2.60	1.30	7.53	4.20	0.50	0.60	2.70	5.85	2.50	2.80
1895.....	+ 27.47	2.50			3.40	4.70	4.32	1.50	2.40	3.40	1.90	1.05	2.30
1896.....	28.87	2.00	0.90	0.40	5.10	2.63	1.34	1.25	0.75	1.70	5.70	6.30	0.80
1897.....	26.02	4.90	1.30	1.50	1.05	2.70	2.20	3.60	2.10	1.70	1.90	1.56	1.51

* Average for 3 years—1891, 1896, 1897.

+ Total for 10 months.

‡ For 8 months.

¶ For 11 months.

MEASUREMENTS AND TEMPERATURE OF GROUND WATER.

In a paper entitled "Typhoid Fever and Low Water in Wells," on pages 89-114 of the Annual Report of this Office for 1884, it is shown that for the years 1878-82 there was a relation between the sickness and deaths from typhoid fever in Michigan and the depth of water in wells. In the month of October, when the water in wells reached the lowest point in the year, there were the most deaths and sickness from typhoid fever; and following the month of April, when the water in wells was highest, there were the least deaths and sickness from typhoid fever. When this comparison is made in a diagram, it is found that, "beginning with June in each year the curve representing sickness from typhoid fever follows more or less closely the curve representing the average depth of earth above the ground water."

On page 256, of the Report of this Board for the year 1889, is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the ten years, 1878 and 1880-88.

On page 229 of the Report for 1891, also on page 226 of the Report for 1892, is a diagram exhibiting the relation of typhoid fever to low water in wells in Michigan, for the 12 years, 1878 and 1880-90.

On page 271 of the Report for 1893 and on page 300 of the Report for 1894, and on page 322 of the Report for 1895, and on page 326 of the Report for 1896, and on page 335 of the Report for 1897 is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the fourteen years, 1878 and 1880-92.

Typhoid fever being one of the most important causes of death in Michigan, it is of very great importance that further evidence be collected on this important subject.

The measurements by months in 1897, of the depth of a well at each of five places in Michigan, are shown in Exhibit 8; also the depth of earth above the water, and the temperature of the water in each of the wells. It is hoped that these measurements and observations may continue, and permit a more extended comparison of the depth of water in wells with the sickness from typhoid fever, and with sickness and deaths from other diseases.

CHANGE OF EXPOSURE OF INSTRUMENTS AT LANSING IN 1884.

Comments on the subject of a new instrument shelter at Lansing are printed on page 21, Report for 1885. Exhibits A, B, C, and D, pages 22 and 23, of the Report of 1886, relate to that subject, and may be studied in connection with what is said on page 21, Report for 1885. The fact of the change of place of observation in 1884 may need to be taken into account by whoever studies the meteorology at Lansing through a long series of years.

EXHIBIT 8.—Depth of Wells; Depth of Ground above Water in Well; Temperature of water in Well, and day of observation of such temperature, in each month of the year 1897; as reported by Meteorological Observers for the State Board of Health, and for the United States Weather Bureau.

Stations in Michigan.	January.			February.			March.			April.			May.			June.		
	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.	Depth of Well.—Ft., In.	Depth of Ground above Water in Well.—Ft., In.	Temp. of Water in Well.—Deg. F.
Traverse City*.....	55	42 6	27 50 16	55	44 10	25 40 15	55	40	24 47 16	55	41	48 15	55	40 10	24 47 17	55	42 6	93 49 15
Lansing, S. B. of H.....	26 11½	25 10½	50 17	26 11½	25 11	49 15	26 11½	25 8½	47 16	26 11½	25 5½	49 16	26 11½	25 1½	50 16	26 11½	25 1	53 16
Ann Arbor.....	17	11 4	46 22	17	10 2	44 18	17	8 6	41 19	17	9 4	50 20	17	9 6	44 17	17	10 4	52 17
Battle Creek.....	61	56 11	45 15	61	57	47 15	61	56 9	48 15	61	53 6	50 15	61	54 7	53 15	61	55 4	53 15
Hillsdale.....	30 6	22 1	50	30 6	22 6	49	30 6	19 11	50	30 6	20 2	48	30 6	21	48	30 6	21 10	50

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

* At Northern Michigan Asylum, Alfred Newman, observer.

EXHIBIT 8.—*Depth of Wells, etc.*—CONTINUED.

Stations in Michigan.	July.			August.			September.			October.			November.			December.		
	Depth of Well—Ft., In.	Depth of Ground above Water in Well—Ft., In.	Temp. of Water in Well—Deg. F.	Depth of Well—Ft., In.	Depth of Ground above Water in Well—Ft., In.	Temp. of Water in Well—Deg. F.	Depth of Well—Ft., In.	Depth of Ground above Water in Well—Ft., In.	Temp. of Water in Well—Deg. F.	Depth of Well—Ft., In.	Depth of Ground above Water in Well—Ft., In.	Temp. of Water in Well—Deg. F.	Depth of Well—Ft., In.	Depth of Ground above Water in Well—Ft., In.	Temp. of Water in Well—Deg. F.	Depth of Well—Ft., In.	Depth of Ground above Water in Well—Ft., In.	Temp. of Water in Well—Deg. F.
Traverse City*	55	40 10	47 ¹⁹	55	42	48 ²⁵	55	40 6	48 ²³	55	40 6	48 ¹⁶	55	40	47 ¹⁶	55	40	47 ²⁸
Lansing, S. B. of H.	26 11½	25 2½	51 ¹⁶	26 11½	24 11½	52 ¹⁶	26 11½	25 4	54 ¹⁵	26 11½	25 8	52 ¹⁶	26 11½	25 9½	53 ¹³	26 11½	25 9½	50 17
Ann Arbor	17	11 6	49 ¹⁶	17	12	50 ¹⁷	17	12 6	52 ¹⁶	17	12 1	55 ²⁹	17	12 8	53 ²¹	17	10 10	48 ²⁶
Battle Creek	61	56 11	53 ¹⁵	61	57 2	55 ¹³	61	57 3	56 ¹⁶	61	55 8	54	61	57 6	52	61	58 2	50
Hillsdale	30 6	22 11	50	30 6	24 1	50	30 6	25 3	52	30 6	55 8	54	30 6	57 6	52	30 6	58 2	50

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

* At Northern Michigan Asylum, Alfred Newman, observer.

TEMPERATURE OF THE ATMOSPHERE.

Compared with the average for the preceding 33 years at the Agricultural College, the temperature for June was low. A comparison, by months in the preceding 33 years, 1864-96, at the Agricultural College, near Lansing, is given in Exhibit 10.

The average temperature by months, for the 18 years, 1879-96, at Lansing, and a comparison of 1897, by months, with that average, are stated in Exhibit 11.

The average temperatures at each of 10 stations in Michigan, and the average for 10 stations in 1897, and in each month of that year, are stated in Table I.

EXHIBIT 9.—Average Temperature by Year and months in 1897,* compared with Annual and Monthly Averages for 1896, and for the 20 years, 1877-96. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Average Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 20 years, 1877-96.	46.33	21.42	23.30	29.74	44.89	56.35	66.55	70.78	68.19	61.41	49.06	36.17	28.11
Av. 18 years, 1879-96.	46.04	21.22	22.44	29.31	44.37	56.33	66.58	70.47	67.91	61.13	48.80	35.97	27.93
1896 (10 stations)...	47.89	24.88	24.57	28.11	51.33	64.77	68.12	71.02	69.61	58.57	45.80	33.70	29.24
1897 (10 stations)...	46.57	22.40	25.64	31.86	43.93	53.55	63.07	73.28	65.59	64.22	53.45	36.06	25.75
In 1897 Higher than Av. for 20 years, 1877-96.....	.24	.98	2.34	2.12	-----	-----	-----	2.50	-----	2.81	4.39	-----	-----
In 1897 Lower than Av. for 20 years, 1877-96.....	-----	-----	-----	-----	.96	2.80	3.48	-----	2.60	-----	-----	.11	2.36
In 1897 Higher than in 1896.....	-----	-----	1.07	3.75	-----	-----	-----	2.26	-----	5.65	7.65	-----	-----
In 1897 Lower than in 1895.....	1.32	2.48	-----	-----	7.40	11.22	5.05	-----	4.02	-----	-----	2.64	3.49

NOTE.—The stations represented in the lines for average temperature for the years 1877-96 in Exhibit 9, are the following: Port Austin for 1885, 1888, 1889; Mendon for 1877-82; Nirvana for 1877-79 and first four months of 1880; Reed City for the last eight months of 1880 and 1881-85; Kalamazoo for 1877-89; Coldwater, Ypsilanti, Woodmere Cemetery (near Detroit), for 1877-79; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Washington for 1879-83; Benton Harbor for 1877-78; Petoskey for 1878-79; Parkville for 1881-82; Hillsdale for 1882-84; Winfield for 1881-1883; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Ionia for 1883-85; Manistique, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Muskegon, Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Otsego for 1887-90. Alma for 1890; Marshall for 1882-92; Gulliver Lake for 1887-90, 1892; Albion for 1890-91; Battle Creek for 1877-80, 1882, 1885, 1888-89, 1891-96; Tecumseh for 1877-85, 1888-89, 1892-96; Harrisville for 1881-82, 1885-86, 1890-96, Thornville for 1877-96; Lansing for 1879-96; Agricultural College for 1877, 1881-96; Ann Arbor, for 1881-96. Traverse City for 1882-86; Birmingham for 1887-96; Adrian for 1891-96.

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 9, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

TABLE I.—Average temperature in Degrees Fahr., for the Year, and for each Month of the Year 1897, at each of 10 stations in Michigan, and also average line for the 10 stations. From observations made daily at 7 A. M., 2 P. M. and 9 P. M.,* local time, by observers† for the State Board of Health.

Stations in Michigan.†	Divisions of the State. ††	Temperature in Degrees Fahr.													
		Year.	Months, †† 1897.												
			Norm. **	1897.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 10 stations §.			46.57	22.40	25.64	31.86	43.93	53.55	63.07	73.28	65.59	64.22	53.45	36.06	25.75
Rockland.....	U. P.	15	41.15	15.14	19.12	24.38	40.64	50.16	58.13	70.00	61.22	62.97	49.32	26.10	16.56
Traverse City.....	N. W.	9	44.30	45.16	23.34	24.52	29.14	41.27	49.23	59.22	70.88	64.59	64.01	53.72	35.38
Harrisville	N. E.	21	42.82	43.76	21.23	23.89	27.78	39.81	47.82	56.22	69.10	64.06	62.73	52.30	35.30
Thornville.....	B. & E.	34	47.91	47.89	23.20	26.88	32.94	45.91	55.89	64.60	74.28	66.00	64.90	54.56	38.34
Agricultural College.	C.	19	46.57	47.01	22.34	26.38	33.00	44.58	55.79	64.21	73.79	65.94	62.92	53.06	36.49
Lansing, S. B. of H..	C.		47.32	47.82	23.74	26.85	33.52	45.06	55.30	65.53	74.32	66.19	64.53	54.31	37.52
Adrian.....	S. C.	17		22.75	27.00	34.87	45.77	55.31	65.17						
Ann Arbor.....	S. C.	7	47.01	47.86	23.50	26.50	34.50	45.20	55.00	65.30	75.10	66.50	64.70	54.00	37.20
Battle Creek.....	S. C.	6	49.47	49.26	23.46	27.52	34.96	45.66	56.39	67.09	76.51	69.16	68.39	55.17	38.50
Tecumseh.....	S. C.	11	47.34	47.29	22.66	27.05	34.04	45.14	54.42	64.71	73.46	65.32	62.50	53.37	37.92
Birmingham.....	S. E.		47.85	48.47	25.37	27.65	34.38	46.00	55.47	65.71	75.34	66.89	64.56	54.71	37.82

* The daily averages are one-third the sum of these three observations.

† The names of observers, their place of observation, and the counties in which these places are situated, are stated in Exhibit I.

§ This line is an average for only the 10 stations from which statements nearly complete were received for every month of the year. It does not include Adrian.

** Numbers in this column state the average annual temperature for periods of years ending in each case with December 31, 1897. The small figures above and at the right of numbers which state the temperature, denote the number of years included in the average.

†† The computations for Av. Temp., as tabulated for months in 1897, were made at the following station: Ann Arbor. All other computations in Table I. were made at the office of the State Board of Health.

‡ Beginning with the year 1855, allowance must be made for Lansing in Table I. because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

†† The names of divisions, and the counties in each, are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

¶ The average for 6 months is 41.81.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days. h for 22 days.

The average line and lines for 8 representative stations in Table I. are graphically represented in Diagram I.

DIAGRAM I.- AVERAGE TEMPERATURE BY MONTHS, 1897.

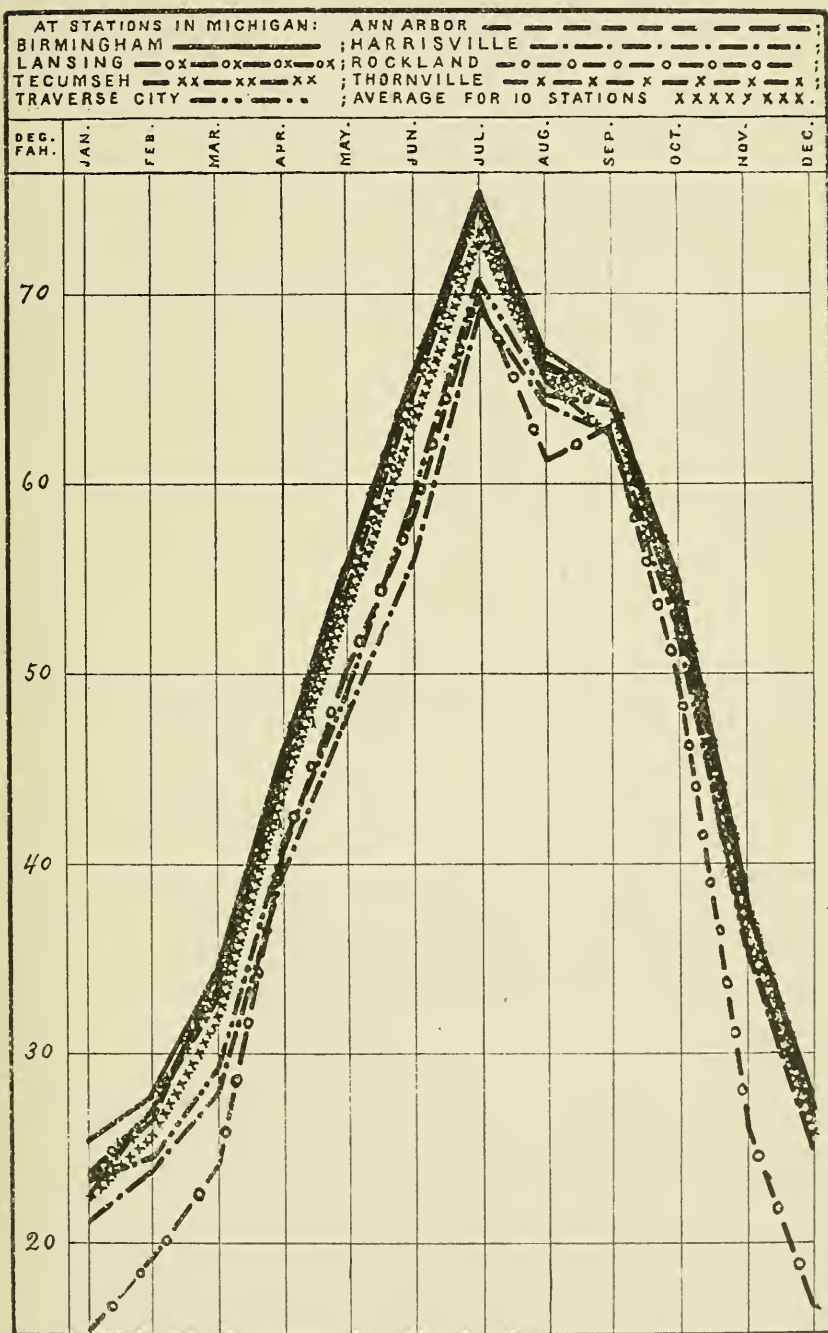


EXHIBIT 10.—*Comparison of the Average Temperature during the Year and during each month of the year 1897, with the Annual and with the Monthly Averages for the Year 1896, and with the Averages for the 33 Years, 1864-96. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Years, etc.	Average Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 33 yrs., 1864-96.	46.56	21.85	23.61	30.85	46.05	58.03	67.88	71.33	68.67	60.52	51.06	35.49	26.59
1896-----	47.99	24.65	24.28	28.70	52.64	66.48	69.87	71.83	69.97	57.62	44.61	37.09	28.13
1897-----	47.01	22.34	26.38	33.00	44.58	55.79	64.21	73.79	65.94	62.92	53.06	36.49	25.62
In 1897 Higher than av. for 33 years, 1864-96 --- In 1897 Lower than av. for 33 years, 1864-96-----	.45	.49	2.77	2.15	-----	-----	-----	2.46	-----	2.40	2.00	1.00	-----
	-----	-----	-----	-----	1.47	2.24	3.67	-----	2.73	-----	-----	-----	.97
In 1897 Higher than in 1896----- In 1897 Lower than in 1896-----	-----	-----	2.10	4.30	-----	-----	-----	1.96	-----	5.30	8.45	-----	-----
	.98	2.31	-----	-----	8.06	.69	5.66	-----	4.03	-----	-----	.60	2.51

EXHIBIT 11.—*Average Temperature by Year and Months in 1897* compared with Annual and Monthly Averages for 1896, and for the 18 Years, 1879-1896. Observations made at office State Board of Health, State Capitol, Lansing, Michigan.*

Years, etc.	Average Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 18 yrs., 1879-96.	47.30	22.19	23.90	31.17	46.57	58.27	68.26	71.93	68.71	61.73	49.55	36.68	28.60
1896.....	48.31	25.01	24.43	28.89	52.71	65.63	68.74	71.28	69.72	58.50	45.81	39.07	29.91
1897.....	47.82	23.74	26.85	33.52	45.06	55.30	65.53	74.32	66.19	64.53	54.31	37.52	26.98
In 1897 Higher than av. for 18 years, 1879-96.	.52	1.55	2.95	2.35	-----	-----	-----	2.39	-----	2.80	4.76	.84	-----
In 1897 Lower than av. for 18 years, 1879-96.....	-----	-----	-----	-----	1.51	2.97	2.73	-----	2.52	-----	-----	-----	1.62
In 1897 Higher than in 1896.....	-----	-----	2.42	4.63	-----	-----	-----	3.04	-----	6.03	8.50	-----	-----
In 1897 Lower than in 1896.....	.49	1.27	-----	-----	7.65	10.33	3.21	-----	3.53	-----	-----	1.55	2.93

* Beginning with the year 1885, slight allowance should be made for Lansing in Exhibit 11, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

EXHIBIT 12.—Average Temperature in degrees Fahr., for the year and months, 1897, at Office State Board of Health, State Capitol, Lansing, Michigan, computed from readings at 7 A. M., 2 P. M. and 9 P. M., daily, from registers of the Draper Self-Recording Thermometer, compared with observations made with Green's Standard mercurial Thermometer at the same hours; both thermometers placed in double latticed shelter for instruments, in the southwest part of the Capitol yard.

Tri-daily readings of instruments specified.	Year.	Average Temperature, in Degrees Fahr.—Year and Months, 1897.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Temp. from tri-daily observations with Green's Standard Mercurial Thermometer.....	47.82	23.74	26.85	33.52	45.06	55.30	65.53	74.32	66.19	64.53	54.31	37.52	26.98
Av. Temp. computed from readings of the Draper's Self-Recording Thermometer.....	48.92	25.69	28.42	34.51	46.29	55.21	64.71	72.85	65.38	64.53	55.11	39.92	*34.43
Higher by Draper's than by Green's Thermometer.....	1.10	1.95	1.57	.99	1.23	-----	-----	-----	-----	-----	.80	2.40	7.45
Lower by Draper's than by Green's Thermometer.....	-----	-----	-----	-----	-----	.09	.82	1.47	.81	0	-----	-----	-----

* For the first half of December only.

EXHIBIT 13.—Average Daily Range of Temperature, by Year and Months in 1897, compared with Annual and Monthly Averages for 1896, and for the 18 years, 1879-96. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Average Daily Range of Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 18 years, 1879-96.....	18.03	15.49	17.14	17.39	19.17	20.36	20.71	21.08	20.46	20.01	17.25	14.13	13.21
1896 (16 stations).....	17.48	11.49	15.56	16.48	19.39	21.82	21.27	19.50	19.93	18.22	18.28	14.64	13.12
1897 (16 stations).....	17.82	14.11	12.78	16.73	18.74	19.72	20.77	19.89	20.60	23.30	19.82	14.20	13.15
In 1897 greater than Av. for 18 years, 1879-96.....	-----	-----	-----	-----	-----	-----	.06	-----	.14	3.29	2.57	.07	-----
In 1897 less than Av. for 18 years, 1879-96.....	.21	1.38	4.36	.66	.43	.64	-----	1.19	-----	-----	-----	-----	.06
In 1897 greater than in 1896.....	.34	2.62	-----	.25	-----	-----	-----	.39	.67	5.08	1.54	-----	.03
In 1897 less than in 1896.....	-----	-----	2.78	-----	.65	2.10	.50	-----	-----	-----	-----	.44	-----

* Otisville for 1879-80, 1882; Escanaba for 1880-87; Marshall for 1882-92; Reed City for 1882, 1884-85; Kalamazoo for 1880-83, 1886-90, 1892-95; Washington for 1882-83; Winfield for 1883; Manistique, Ionia, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Hillsdale for 1884; Pentwater, East Saginaw, Hudson for 1886; Port Austin for 1888-89; Gulliver Lake for 1887-90, 1892; Alma, Otsego for 1890; Albion for 1890-91; Manistee for 1889-92; Battle Creek for 1879-80, 1888-89, 1891; Tecumseh for 1883-85, 1892-96; Adrian for 1880, 1894-96; Marquette for 1879-84, 1886-96; Grand Haven for 1879-88, 1890-96; Detroit, Lansing for 1879-96; Alpena, Port Huron, Thornville for 1880-96; Agri College for 1881-96; Traverse City for 1882-96; Harrisville for 1882, 1885-96; Ann Arbor for 1882-83, 1885-96; Birmingham for 1887, 1889-96; Rockland for 1891-92, 1894-96; Sault Ste. Marie for 1892-96.

TABLE II.—*Extremes of Temperature and Days of Month on which the Highest and for the Year 1897, at each of 16 Stations in Michigan.—As indicated by daily Readings P. M., by Observers* for the State Board of Health, and for the United States Weather*

Line number.	Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics.)	Year, 1897.			January.		February.		March.		April.		May.	
		Highest.	Lowest.	Range.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
1	At 16 stations†-----	102	-21	123	58	-19	46	-21	70	-14	79	5	84	22
2	Rockland‡-----	95	-18	113	48 ²	-18 ²⁶	39 ¹⁹	-15 ²⁷	64 ²⁹	-8 ¹⁵	76 ²⁷	5 ¹⁹	84 ⁸	22 ¹
3	Marquette§-----	97	-15	112	47 ²	-15 ²⁴	36 ²⁰	-10 ²⁷	49 ²⁹	-2 ¹⁵	73 ²²	9 ¹⁹	78 ¹⁷	33 ¹
4	Sault Ste. Marie§-----	92	-21	113	44 ^{3,4}	-19 ²⁴	36 ³	-21 ²⁶	55 ³⁰	-14 ¹⁶	66 ²²	5 ¹⁹	72 ¹⁷	30 ¹⁶
5	Traverse City‡-----	98	-12	110	56 ³	-5 ^{23, 24}	46 ¹⁷	-4 ²⁵	58 ³⁰	-12 ¹⁵	73 ²⁸	12 ¹⁹	83 ⁸	30 ¹
6	Alpena§-----	98	-7	105	49 ²	-7 ²⁴	40 ¹⁷	-5 ²⁷	52 ¹⁸	-3 ¹⁶	73 ²⁰	10 ¹⁹	80 ⁹	34 ¹
7	Harrisville‡-----	97	-10	107	46 ²	-10 ^{23, 24}	45 ¹⁷	-7 ²⁶	52 ¹⁸	0 ¹⁵	75 ²²	14 ¹⁹	74 ⁹	32 ²⁵
8	Grand Haven§-----	93	0	93	58 ^{2, 3}	0 ²⁴	42 ¹⁶	7 ²⁷	65 ³⁰	5 ¹⁶	76 ²⁸	18 ²⁰	82 ⁸	34 ^{1, 2}
9	Port Huron§-----	96	-13	109	56 ³	-13 ²⁵	38 ¹	1 ²⁷	55 ²¹	8 ¹	74 ²²	19 ²⁰	80 ⁹	36 ²
10	Thornville‡-----	98	-8	106	53 ²	-8 ²⁵	44 ¹⁷	1 ²⁷	58 ³¹	5 ¹⁶	74 ^{23, 24, 28}	17 ²⁰	83 ⁹	34 ²⁶
11	Agr'l College‡-----	100	-17	117	54 ^{2, 3}	-17 ²⁴	46 ¹⁷	-4 ²⁶	67 ³⁰	2 ¹⁵	77 ²⁸	14 ¹⁹	81 ^{9, 18}	30 ²⁴
12	Lansing, S. B. of H.‡-----	97	-12	109	56 ²	-12 ²⁴	44 ¹⁷	0 ²⁶	65 ³⁰	7 ¹⁵	75 ^{24, 28}	15 ¹⁹	80 ⁹	32 ²⁴
13	Adrian‡-----	-----	-----	-----	58 ³	-17 ²⁴	45 ¹⁷	2 ²⁶	62 ³⁰	15 ^{6, 26}	77 ²⁴	17 ¹⁹	80 ⁹	34 ^{1, 30}
14	Ann Arbor‡-----	102	-16	118	54 ²	-16 ²³	45 ¹⁷	26 ²⁷	61 ³⁰	11 ⁶	78 ²⁴	16 ¹⁹	81 ⁹	34 ¹
15	Battle Creek‡-----	98	-14	112	56 ³	-14 ²⁶	43 ¹⁷	1 ²⁷	70 ³⁰	14 ¹⁶	79 ²⁸	20 ^{20, 9, 19}	78 ⁹	34 ¹
16	Tecumseh‡-----	95	-18	113	57 ³	-18 ²⁴	44 ¹⁷	26 ²⁷	61 ³⁰	15 ^{30, 6, 14, 26}	78 ²⁴	19 ¹⁹	79 ⁹	33 ³⁰
17	Birmingham‡-----	101	-15	116	58 ³	-15 ²⁴	46 ¹⁷	0 ²⁶	62 ⁹	10 ¹	76 ²⁴	18 ¹⁹	81 ⁹	30 ²⁵
18	Detroit§-----	94	-16	110	58 ³	-16 ²⁵	44 ¹⁷	4 ²⁷	57 ¹⁸	13 ¹	73 ^{22, 24}	20 ²⁰	79 ⁹	2, 31 ³⁶

NOTE.—The small figures above and at the right of numbers denoting the degrees of temperature, state the day or days of the month on which the highest or lowest temperature occurred.

* The names of observers, etc., are stated in Exhibit 1.

† The line No. 1, and the three columns for the year 1897, relate only to the 16 stations from which observations were received for every month of the year. It does not include Adrian.

‡ For stations marked thus ‡, the daily readings of registering thermometers were recorded at 7 A. M. for the preceding calendar day.

§ At the stations of the U. S. Weather Bureau, the maximum thermometer was read and recorded at 8:00 A. M., and the minimum at 8:00 P. M., 75th Meridian time. The local time at these stations corresponding to 8:00 A. M. and 8:00 P. M., 75th Meridian time, is as follows: At Port Huron, 7:30 A. M. and 7:30 P. M.; at Detroit, 7:28 A. M. and 7:28 P. M.; at Alpena, 7:26 A. M. and 7:26 P. M.; at Grand Haven, 7:15 A. M. and 7:15 P. M.; at Marquette, 7:11 A. M. and 7:11 P. M.; at Sault Ste. Marie, 7:23 A. M. and 7:23 P. M.

|| At Battle Creek the registering thermometers were read and recorded at 9 P. M.

* Beginning with the year 1885 allowance must be made for Lansing in Table II, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit B, on page 22, Report for 1886.

the Lowest Temperature occurred by Months of the Year 1897; also, Extremes and Range of Registering Thermometers, or by Observations made daily at 7 A. M., 2 P. M. and 9 Bureau.

June.		July.		August.		September.		October.		November.		December.		Line number.
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	
92	27	102	46	94	38	98	28	91	25	65	-5	57	-16	1
88 ¹³	27 ⁵	95 ⁸	46 ¹²	85 ¹³	22, 23 ³⁸	91 ⁴	33 ²⁰	82 ²⁵	25 ¹⁷	65 ³	28, 30 ⁻⁵	50 ⁹	-15 ¹⁷	2
81 ¹⁴	31 ⁵	97 ³	55 ¹²	86 ¹³	40 ²²	94 ⁹	39 ²⁰	82 ⁴	30 ²⁹	49 ³	3 ²⁸	48 ⁹	-5 ¹⁷	3
81 ¹⁵	32 ⁷	92 ^{4, 6}	47 ¹	85 ²	42 ³¹	91 ⁹	20, 21 ³⁵	78 ¹⁴	26 ²⁹	54 ³	7 ²³	45 ⁹	-16 ²⁴	4
88 ¹⁴	31 ⁶	98 ⁷	50 ¹³	85 ⁹	41 ¹⁸	95 ⁹	35 ²⁰	82 ⁴	30 ³⁰	63 ⁴	11 ²⁷	51 ⁹	1, 23 ⁵	5
79 ²²	37 ⁹	98 ⁴	52 ¹⁴	83 ¹³	42 ²⁰	94 ⁹	34 ²¹	84 ¹⁵	33 ¹⁰	60 ⁴	13 ³⁰	49 ⁹	0 ²⁴	6
82 ¹²	32 ⁸	90 ⁹	52 ¹	85 ¹³	18, 19, 29 ⁴²	97 ⁹	30 ²⁰	87 ¹⁵	30 ²⁸	64 ³	10 ²⁹	49 ¹⁰	-6 ²³	7
84 ¹⁴	37 ¹	93 ⁹	50 ¹⁴	86 ²	44 ²⁶	92 ¹⁴	34 ²¹	79 ⁴	33 ³¹	64 ⁴	29, 30 ¹⁶	57 ¹⁰	8 ²⁴	8
15, 29 ⁸⁷	9, 21 ⁴⁰	96 ¹⁰	55 ¹⁴	84 ^{2, 3}	45 ³¹	9, 10 ⁹⁵	34 ²¹	87 ¹⁵	18, 29 ³⁴	62 ³	15 ³⁰	54 ¹⁰	-2 ²⁴	9
90 ¹⁵	38 ⁹	98 ⁴	58 ^{13, 14}	86 ³	42 ³¹	9, 10 ⁹³	33 ²¹	86 ¹⁵	31 ¹⁸	60 ¹⁵	15 ³⁰	52 ¹⁰	24, 28 ⁻⁴	10
91 ¹⁵	34 ^{8, 9, 10}	100 ¹³	51 ³	90 ³	16, 19 ⁴⁰	8, 9 ⁹⁴	28 ²⁰	89 ¹	28, 30 ³⁰	63 ⁴	29, 30 ¹⁵	54 ⁹	-13 ²³	11
90 ¹⁵	39 ²⁰	97 ^{9, 10}	55 ¹²	88 ³	42 ¹⁹	9, 15 ⁹³	32 ²⁰	88 ¹	33 ²⁴	63 ⁴	14 ²⁹	55 ⁹	23, 24 ⁻⁵	12
90 ¹⁵	39 ⁸													13
91 ¹⁶	35 ¹	102 ⁹	54 ¹⁴	92 ³	19, 30 ⁴⁴	96 ⁹	35 ²⁷	91 ¹	33 ¹⁶	62 ⁴	14 ³⁰	53 ¹⁰	-5 ²⁴	14
90 ¹⁵	45 ^{1, 2, 8}	96 ⁴	58 ¹⁴	92 ³	49 ²⁰	8, 9, 10 ⁹⁸	39 ²¹	85 ^{1, 23, 24, 31}	39 ³¹	62 ⁴	24, 29 ²⁰	56 ¹⁰	-3 ²⁴	15
88 ¹⁵	41 ⁸	95 ⁹	53 ¹⁴	88 ³	19, 30 ⁴⁵	10, 16 ⁹⁰	32 ²⁰	86 ^{1, 15}	32 ³⁰	60 ^{15, 20}	16 ²³	53 ¹⁰	23, 24 ⁻⁷	16
92 ²⁹	38 ⁸	101 ⁴	50 ⁸	94 ³	44 ²⁵	92 ⁹	29 ²⁰	86 ¹	7, 30 ³¹	60 ¹⁵	12 ²³	52 ¹⁰	-4 ²³	17
15, 29 ⁸⁹	41 ⁹	94 ^{4, 10}	57 ¹⁴	84 ³	17, 20 ⁴⁹	93 ¹⁰	39 ²¹	88 ¹	37 ¹⁸	59 ^{3, 4}	18 ³⁰	54 ¹⁰	-2 ²⁴	18

The average daily range of temperature at from 6 to 19 stations per year, by months, for a period of 18 years, 1879-1896, and a comparison of 1897 with the monthly averages for that period and for 1896, are given in Exhibit 13. The highest and lowest temperatures in every month in 1897, at each of 16 stations, are stated in Table II. The average daily range of temperature by months in 1897, at each of 17 stations, and the average for 16 of the stations, are stated in Table III. The lines for 10 of these stations, and the average line for 16 of the stations, are represented in Diagram II. It will be noticed that the greatest average daily range occurred during the month of September.

TABLE III.—Average Daily Range of Temperature, by Registering Thermometers during the Year and during each Month of the Year 1897, at each of 16 Stations in Michigan, and Average for 16 Stations.

Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics.)	Divi- sions of the State.†	Nor- mal. + ‡	Average Daily Range of Temperature—Degrees Fahr.											
			Year 1897.	Months, 1897.										
				Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.
Av. for 16 Stations §.	-----	-----	17.82	14.11	12.78	16.73	18.74	19.72	20.77	19.89	20.60	23.30	19.82	14.20
Rockland	U. P.	21.00 ²	21.28	16.16	19.38 ^e	22.87	26.77	26.62	22.13	21.74	21.38	23.77 ^f	18.92 ^g	16.90
Marquette	U. P.	15.12 ¹²	14.39	13.52	11.80	13.97	16.30	15.10	16.17	16.40	16.00	19.47	13.10	9.70
Sault Ste. Marie	U. P.	16.87 ⁶	16.84	14.20	15.20	16.90	19.00	18.60	20.70	21.60	18.30	20.30	12.50	11.20
Traverse City	N. W.	19.74 ¹⁶	19.88	15.93	15.47	20.55	22.53	22.76 ^f	22.11 ^c	21.00 ^e	21.81	24.64	22.23	16.27
Alpena	N. E.	15.56 ¹⁸	14.25	11.65	11.07	12.94	14.77	15.94	17.37	15.48	18.48	19.13	13.45	10.93
Harrisville	N. E.	19.92 ¹³	18.30	16.65	16.82	18.32	16.80	18.38	20.87	17.04	21.46	22.70	18.10	17.14
Grand Haven	W.	15.11 ⁸	16.08	12.80	11.50	14.60	17.40	17.10	17.90	18.00	17.60	21.80	19.60	13.50
Port Huron	B. & E.	15.81 ¹⁸	15.85	12.00	8.30	13.40	15.90	18.48	19.60	17.20	19.30	21.30	19.80	13.07
Thornville	B. & E.	22.07 ¹⁸	15.98	10.26	9.61	12.26	16.33	18.52	21.30	17.74	20.28	23.13	20.10	11.90
Agricultural College.	C.	21.11 ¹⁶	22.74	15.97	15.29 ^d	19.42	21.33	26.18 ^b	27.70	28.61	29.06	30.60	26.39	16.84
Lansing S. B. of H....	C.	19.45 ¹⁹	19.42	14.29	12.36	17.68	19.60	21.39	22.10 ^d	21.32	22.97	27.57	24.10	15.43
Adrian	S. C.	-----	¶	14.68	9.54	17.68	19.67	20.71	22.85	-----	-----	-----	-----	-----
Ann Arbor	S. C.	18.17 ¹⁶	20.54	15.50	12.40	18.60	20.50	21.20	24.20	24.50	25.50	26.10	26.00	18.40
Battle Creek	S. C.	-----	15.58	13.07	9.79	16.74	17.00	17.81	17.47	16.58 ^a	17.78	21.90	17.87	10.00
Tecumseh	S. C.	19.28 ⁶	19.01	15.10	12.89	17.23	19.76	19.74	20.53	21.13	20.19	26.33	24.13	16.07
Birmingham	S. E.	20.97 ¹¹	20.00	15.84	13.04	17.54	19.80	21.32	24.70	23.80	23.45	25.23	23.48	16.74
Detroit	S. E.	15.54 ¹⁹	14.93	12.80	9.50	14.70	16.00	16.40	17.40	16.10	16.00	18.80	17.40	13.10

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1.

† For counties in each division see Exhibit I, in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the annual average range of temperature for periods of years ending in each case with December 31, 1897. The small figures above and at the right of numbers which state the range of temperature, denote the number of years included in the average.

§ This line is an average for all stations for which statements nearly complete are given for every month of the year. It does not include the line for Adrian.

¶ The average for 6 months is 17.52.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days.

NOTE.—Graphic representations of statements in Table III. are given in Diagram II.

DIAGRAM II.- AV. DAILY RANGE OF TEMPERATURE, BY MONTHS, 1897.

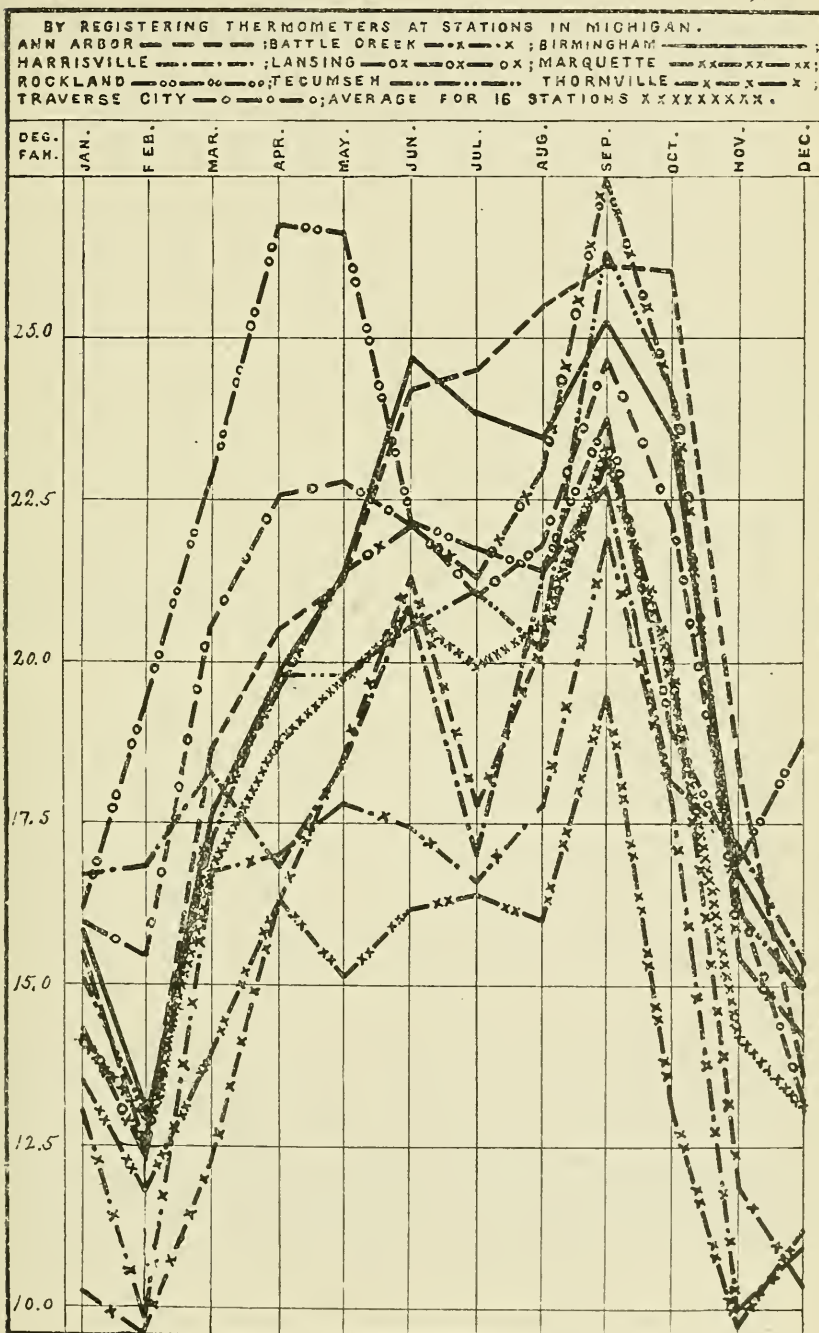


EXHIBIT 14.—*Comparisons of the Average Daily Range of Temperature for the Year and for each Month of the Year 1897, with Averages for the 23 years, 1874-96, and for the Year 1896. Observations made with Registering Thermometers by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, &c.	Average Daily Range of Temperature—Degrees Fahr.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 23 yrs., 1874-96*	29.90	12.66	18.82	19.06	22.33	23.51	23.59	25.59	26.26	24.98	21.40	16.55	15.38
1896.....	21.94	14.80	18.55	18.71	22.73	26.30	27.96	24.42	27.39	24.50	26.62	16.70	14.65
1897.....	22.74	15.97	15.29	19.42	21.33	26.18	27.70	28.61	29.06	30.60	26.39	16.84	15.51
In 1897 Greater than av. for 23 years, 1874-96.....	-----	3.31	-----	.36	-----	2.67	4.11	3.02	2.80	5.62	4.99	.29	.13
In 1897 Less than av. for 23 years, 1874-96.....	7.16	-----	3.53	-----	1.00	-----	-----	-----	-----	-----	-----	-----	-----
In 1897 Greater than in 1896.....	.80	1.17	-----	.71	-----	-----	-----	4.19	1.67	6.10	-----	.14	.86
In 1897 Less than in 1896.....	-----	-----	3.26	-----	1.40	.12	.26	-----	-----	-----	.23	-----	-----

* For the years 1874-6, 1878, 1879 (except Nov. and Dec.), and 1880, the computations were made from the report of observations published in the Reports of the State Board of Agriculture for those years. For 1877, 1881 (except Jan.), 1882-97, the computations were made from registers or copies of registers supplied by Dr. Kedzie.

The average annual and monthly temperatures at from 10 to 22 stations for a period of 20 years, 1877-96, are stated in Exhibit 9, in which is also given, by months, a comparison of 1897 with the average for 1896, and with the averages for the 20 years, 1877-96. By Exhibit 9, which gives averages for groups of several stations in Michigan, it appears that in 1897 the mean temperature in January, April, May, June, August, November and December was lower than in those months in 1896. It also appears that January, February, March, July, September and October were warmer than the average temperature of the corresponding months for the 20 years, 1877-96.

By Exhibit 16, it appears that, at the Agricultural College, the lowest temperature reached in June, 1897, was below the average lowest temperature for the corresponding month in the preceding 24 years, and that in the month of May, 1897, the range of temperature was less than the average range of temperature for the corresponding month in the 24 preceding years, and also the highest temperature for 1897 was higher than the average highest temperature for the preceding 24 years, and the lowest temperature was above the average lowest temperature for those years. The highest and lowest temperatures at the Agricultural College, in every month in the 7 years, 1891-97, and comparison of months in 1897 with the average highest and lowest temperatures by months for the preceding 24 years, are stated in Exhibit 16.

EXHIBIT 15.—Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each month of the Year 1897, with the Average of the Extremes, and of the Range, for the 20 Years, 1877-96, also Statement of the Extremes and of the Range for each of the Seven Years, 1891-97. Observations made with Registering Thermometers by Observers for the State Board of Health, and for the U. S. Weather Bureau. These Comparisons, etc., are for Groups of Several Stations in Michigan.

Year and Months.	Extremes and Ranges of Temperature—Degrees Fahrenheit.																	
	1891.			1892.			1893.			1894.			1895.			1896.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year.	100	-14	114	102	-24	126	97	-26	123	102	-26	128	100	-28	128	98	-25	123
Av. month	78	14	64	77	12	65	77	11	66	81	10	71	80	9	71	78	9	69
January..	52	-10	62	57	-22	79	49	-26	75	57	-18	75	50	-12	62	45	-25	70
February.	55	-14	69	52	-24	76	44	-23	67	54	-26	80	54	-28	82	59	-22	81
March....	58	-8	66	64	-13	77	66	-6	72	79	-2	81	69	-16	85	69	-16	85
April.....	87	10	77	79	13	66	80	9	71	88	12	76	82	17	65	87	7	80
May.....	85	25	60	85	27	58	88	27	61	94	30	64	98	26	72	98	33	65
June.....	97	31	66	102	34	68	96	36	60	98	33	65	99	37	62	91	37	54
July.....	95	37	58	97	41	56	96	43	53	102	37	65	100	38	62	95	39	56
August...	100	37	63	95	37	58	97	38	59	99	32	67	97	36	61	96	35	61
September	93	35	58	92	30	62	89	22	67	99	29	70	98	28	70	88	22	66
October..	87	21	66	82	23	59	84	22	62	80	20	60	80	10	70	77	15	62
November	65	-3	68	64	5	59	68	6	62	67	-7	74	72	-1	73	67	-3	70
December..	60	8	52	58	-11	69	62	-14	76	60	-19	79	63	-24	87	59	-16	75

* For the 20 years, 1877-96, the highest temperature was 105°, at Battle Creek, September 9, 1884: the lowest was -36°, at Manistique, January 27, 1885.

Foot-notes to Exhibit 17:

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 17, because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, on page 23, Report for 1886.

+ Kalamazoo for 1877-83, 1886-89; Mendon for 1877-82; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Benton Harbor, Coldwater for 1877-78; Washington for 1880-83; Petoskey for 1879; Winfield for 1881, 1883; Woodmere Cemetery for 1877-79; Hastings, Parkville for 1882; Hillsdale for 1882-84; Manistique for 1884-85; Mackinaw City for 1884-87; Ionia for 1884; Swartz Creek for 1884-85; Pentwater for 1886; Escanaba for 1880-87; Marquette for 1879-84, 1886-87; Gulliver Lake for 1887-90, 1892; Albion for 1890-91; Battle Creek for 1877-79, 1882, 1885, 1892-93; Alma for 1890; Marshall for 1882-92; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Tecumseh for 1878-85, 1894-96; Thornville for 1877-96; Lansing for 1879-96; Agr'l College for 1877, 1881-96; Ann Arbor for 1881-96; Traverse City for 1882-96; Birmingham for 1887-96; Harrisville for 1882, 1885-86, 1895-96.

EXHIBIT 16.—*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each Month of the Year 1897, with the Average of the Extremes and of the Range, for the 24 years, 1873-96, also Statements of the Extremes and of the Range for each of the 7 Years, 1891-97. Observations made with Registering Thermometers (except for the first two months of 1873, and for those two months with an ordinary thermometer, at 7 A. M., 2 P. M. and 9 P. M.) Daily by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Year and Months.	Extremes and Range of Temperature—Degrees F.																										
	1891.			1892.			1893.			1894.			1895.			1896.			Av. 24 years. 1873-96.			* 189			1897 Higher (+), or Lower (-), than Av. 24 years. 1873-96.		
	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.	Highest.	Lowest.	Range.
Year	97	-4	101	95	-20	115	95	-16	112	102	-18	120	100	-24	124	94	-22	116	95	-18	113	100	-17	117	+5	+1	+4
Av. Month	73	19	54	71	19	52	74	18	56	78	15	63	77	12	65	75	13	62	74	17	57	76	18	58	+2	+1	+1
January ..	51	2	49	50	-20	70	45	-16	61	52	-18	70	40	-10	50	41	-17	58	48	-11	59	54	-17	71	+6	-6	+12
February ..	54	-4	58	48	-14	62	43	-10	53	47	-17	64	48	24	72	54	-22	76	50	-10	60	46	-4	50	-4	+6	-10
March	58	2	56	62	9	53	63	5	58	75	9	66	69	-12	81	63	-2	65	61	0	61	67	2	65	+6	+2	+4
April	79	19	60	73	20	53	76	21	55	77	18	59	82	20	62	86	17	69	78	17	61	77	14	63	-1	-3	+2
May	80	26	54	80	31	49	83	33	50	85	30	55	95	34	61	90	38	52	85	30	55	81	30	51	-4	=	-4
June	88	37	51	87	42	45	90	51	39	96	34	62	99	37	62	93	40	53	91	40	51	91	34	57	=	-6	+6
July	86	42	44	95	45	50	92	46	46	102	37	65	100	38	62	94	39	55	93	45	48	100	51	49	+7	+6	+1
August	97	40	57	90	45	45	95	38	57	99	32	77	97	36	61	94	35	59	94	39	55	99	40	50	-4	+1	-5
September ..	90	38	52	87	39	48	84	22	62	99	29	70	94	28	66	86	22	64	89	31	58	94	28	66	+5	-3	+8
October	84	21	63	78	24	54	84	22	62	80	20	60	71	10	61	73	15	58	78	21	57	89	30	59	+11	+9	+2
November ..	58	0	58	58	13	45	65	6	59	65	10	55	72	5	67	67	8	59	63	9	54	63	15	48	=	+6	-6
December ..	55	12	43	46	-10	56	62	-8	70	53	-10	63	56	-24	80	58	-16	74	53	-4	57	54	-13	67	+1	-9	+10

* For the 23 years, 1873-95, the highest temperature was 101°, August 11, 1874; the lowest was -33°, February 8, 1875, and the range was 134° F.

Foot-notes to Exhibit 19:

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 19, because of a change in the location of instruments. The amount of the variation is shown in Exhibit D, on page 23, Report for 1886.

+ Mackinaw City for 1884-87; Kalamazoo for 1878-83, 1886-89; Mendon for 1878-82; Otisville for 1878-80, 1882; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Niles for 1878-79, 1881; Woodmere Cemetery for 1878-79; Washington for 1880-83; Coldwater for 1878; Petoskey for 1879; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Hillsdale for 1882-84; Hastings for 1882; Winfield for 1883; Manistique, Swartz Creek for 1884-85; Ionia for 1884; Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1878-87; Gulliver Lake for 1887-90, 1892; Alma for 1890; Marshall for 1882-92; Albion for 1890-91; Rockland for 1892; Battle Creek for 1878-79, 1882, 1885, 1892-93; Tecumseh for 1878-85, 1894-96; Harrisville for 1882, 1885-86, 1894-96; Thornville for 1878-96; Ann Arbor for 1881-96; Lansing for 1879-96; Agricultural College for 1881-96; Traverse City for 1882-96; Birmingham for 1887-96.

EXHIBIT 17.—*Average Absolute Humidity, by year and months in 1897, compared with Annual and monthly Averages for 1896, and for the 20 years, 1877-96.* These Averages are for groups of several stations in Michigan.*

Years, etc.	Absolute Humidity—Grains of Vapor in a Cubic Foot of Air.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 20 yrs., 1877-96†	3.45	1.44	1.52	1.81	2.84	4.00	5.54	6.04	5.76	4.91	3.47	2.32	1.81
1896 (8 stations)----	3.65	1.54	1.50	1.56	3.69	5.03	5.64	6.43	6.40	4.66	3.06	2.60	1.75
1897 (8 stations)----	3.57	1.57	1.58	2.00	2.93	3.91	5.26	6.85	5.61	5.18	3.89	2.38	1.71
In 1897 Greater than av. for 20 yrs., 1877-96.....	.12	.13	.06	.19	.09	-----	-----	.81	-----	.27	.42	.06	-----
In 1897 Less than av. for 20 years, 1877-96.....	-----	-----	-----	-----	-----	.09	.28	-----	.15	-----	-----	-----	.10
In 1897 Greater than in 1896.....	-----	.03	.08	.44	-----	-----	-----	.42	-----	.52	.83	-----	-----
In 1897 Less than in 1896.....	.08	-----	-----	-----	.76	1.12	.38	-----	.79	-----	-----	.22	.04

*For foot-notes to Exhibit 17 see page 27.

EXHIBIT 18.—*Comparison of the Average Absolute Humidity for the year and for each month of the year 1897, with Averages for the 31 years, 1866-96, and for the year 1896. Observations made at 7 A. M., 2 P. M. and 9 P. M., daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

Years, etc.	Absolute Humidity—Grains of Vapor in a Cubic Foot of Air.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 31 yrs., 1866-96.	3.52	1.48	1.56	1.87	2.81	4.10	5.73	6.35	5.99	4.91	3.36	2.25	1.74
1896.....	4.29	1.85	1.87	2.10	4.35	5.93	6.83	7.60	7.45	5.25	3.41	2.85	1.99
1897.....	4.17	1.83	1.96	2.43	3.43	4.88	6.48	7.83	6.32	5.93	4.37	2.57	1.97
In 1897 Greater than av. for 31 years, 1866-96.....	.65	.35	.40	.56	.62	.78	.75	1.48	.33	1.02	1.01	.32	.23
In 1897 Less than av. for 31 years, 1866-96.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
In 1897 Greater than in 1896.....	-----	-----	.09	.33	-----	-----	-----	.23	-----	.68	.96	-----	-----
In 1897 Less than in 1896.....	.12	.02	-----	-----	.92	1.05	.35	-----	1.13	-----	-----	.28*	.02

EXHIBIT 19.—Average Relative Humidity, by year and months, in 1897,* compared with Annual and Monthly Averages for 1896, and for the 19 years, 1878-1896. These averages are for groups of several stations in Michigan.

Years, etc.	Per Cent of Saturation—Relative Humidity.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 19 yrs., 1878-96†	76	83	82	78	71	70	73	71	73	75	76	80	83
1896 (8 stations)....	77	83	79	76	74	72	72	76	78	80	76	81	82
1897 (8 stations)....	78	83	82	81	77	76	76	76	77	77	77	80	83
In 1897 Greater than av. for 19 years, 1878-96..... In 1897 Less than av. for 19 years, 1878-96.....	2	0	0	3	6	6	3	5	4	2	1	0	0
In 1897 Greater than in 1896..... In 1897 Less than in 1896.....	1	0	3	5	3	4	4	0			1		1
									1	3		1	

*For foot-notes to Exhibit 19 see page 23.

EXHIBIT 20.—*Comparison of the Average Relative Humidity of the Air (Per Cent of Saturation) for the year, and for each month of the year 1897, with averages for the 33 years, 1864-96, and for 1896. Observations made at 7 A. M., 2 P. M. and 9 P. M., daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Per Cent of Saturation—Relative Humidity.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 33 yrs., 1864-96.	80	87	86	83	71	70	76	73	76	79	79	83	86
1896.....	90	96	96	95	84	83	83	88	89	92	89	92	91
1897.....	91	97	97	94	90	90	88	88	83	87	88	89	96
In 1897 Greater than av. for 33 years, 1864-96.....	11	10	11	11	19	20	12	15	12	8	9	6	10
In 1897 Less than av. for 33 years, 1864-96.....													
In 1897 Greater than in 1896.....	1	1	1		6	7	5	0					5
In 1897 Less than in 1896.....				1					1	5	1	3	

TABLE IV.—ABSOLUTE HUMIDITY.—*The Average Number of grains of Vapor of Water in a Cubic Foot of Air for Months and Year, 1897, at 8 Stations in Michigan; also Average Line for 8 Stations.—Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M., by Observers* for the State Board of Health.*

Stations in Michigan.*	Divisions of the State.†	Grains of Vapor in a Cubic Foot of Air - (Absolute Humidity.)‡													
		Year.	Months, 1897.												
			Norm. + 1897.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 sta- tions†-----		-----	3.57	1.57	1.58	2.00	2.93	3.91	5.26	6.85	5.61	5.18	3.89	2.38	1.71
Rockland.....	U. P.	----- 16 **		a		g	e	3.04 l	d 4.19	b 5.94	b 4.67	h 5.18	m 3.51	o 2.13	-----
Traverse City..	N. W.	3.38 3	3.47	1.88	1.75	2.04 a	2.75	3.34	4.60	6.36	5.42	5.21	3.93	2.41	1.91
Harrisville.....	N. E.	2.97 21	3.03	0.89 a	0.97	1.27	2.41	3.16	4.10	6.25	5.24	5.03	3.74	2.03	1.24
Thornville.....	B. & E.	3.66 18	3.65	1.78	1.85	2.20	3.26	4.04 h	5.16	6.68	5.46	4.98	3.90	2.62	1.91
Agr'l College..	C.	3.60 19	4.17	1.83	1.96	2.43	3.43	4.88	6.48	7.83	6.32	5.93	4.37	2.57	1.97
Lansing, S. B. † of H. ‖-----	C.	3.37 17	3.36	1.46	1.46	1.88	2.76	3.60	5.03	6.45	5.27	4.81	3.68	2.23	1.65
Ann Arbor.....	S. C.	3.51	3.63	1.56	1.57	2.05	2.77	4.16	5.56	7.13	5.88	5.47 e	3.61 a	2.26 i	1.59
Battle Creek..	S. C.	----- 4 ††	1.93 a	2.01	2.60	3.76	4.47 m	5.80	7.46	6.47 a	6.00	4.48 a	2.97 d	-----	-----
Tecumseh.....	S. C.	3.51 11	3.52	1.37 m	1.58	2.05 h	2.92 a	3.89 e	5.43 b	6.72 g	5.54 a	4.79 d	3.78 d	2.45 c	1.70 e
Birmingham...	S. E.	3.63	3.76	1.79	1.53	2.04	3.16	4.19	5.69	7.41	5.76	5.18	4.13	2.47	1.72

* The names of the observers, their places of observation, and the counties in which these places are situated are stated in Exhibit I.

† The full names of the divisions and the counties in each division are stated in Exhibit I, in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual Absolute Humidity for periods of years ending in each case with December 31, 1897. The small figures above and at the right of numbers which state the Absolute Humidity, denote the number of years included in the average.

§ The number of grains of vapor in a cubic foot of air at each observation was determined from readings of the psychrometer by means of Glaisher's table, Table XII, of the Smithsonian Meteorological and Physical Tables (1859).

¶ This line is an average for only the stations at which observations were made tri-daily, and from which statements, nearly complete, were received for every month of the year. It does not include the lines for Rockland and Battle Creek.

** The average for 7 months is 4.08. †† For 11 months, 4.36.

|| Beginning with the year 1885, allowance must be made for Lansing in Table IV., because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, page 23, Report for 1886.

NOTE.—The computations of Absolute Humidity at Ann Arbor for each month in 1897 were furnished by the observer there. All other computations in Table IV. were made at the office of the Secretary of the State Board of Health.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.

b For 91 observations.

c For 90 observations.

d For 89 observations.

e For 88 observations.

f For 87 observations.

g For 86 observations.

h For 83 observations.

i For 76 observations.

j For 75 observations.

k For 74 observations.

l For 71 observations.

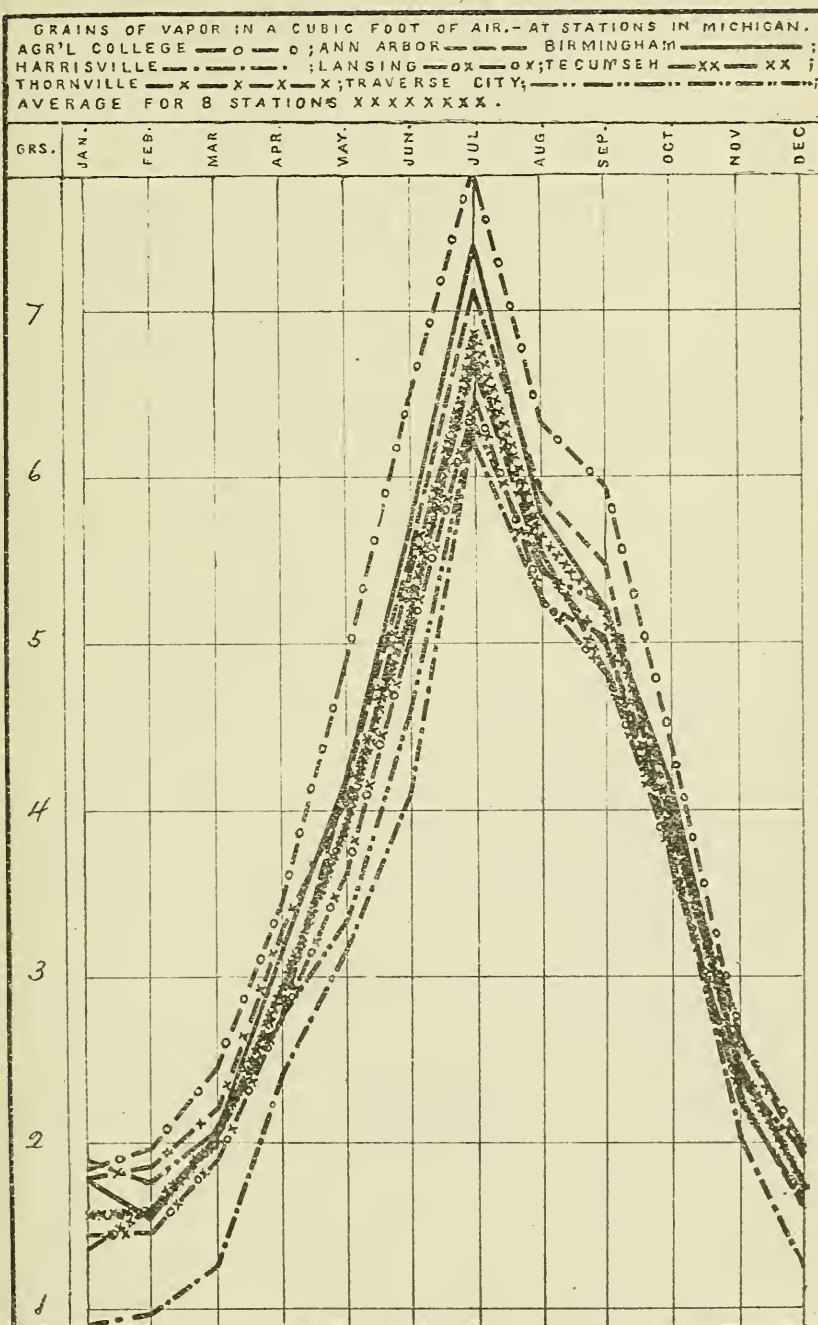
m For 67 observations.

n For 67 observations.

o For 63 observations.

The "average" line and the lines for eight stations in Table IV. are graphically represented in Diagram III.

DIAGRAM III.-ABSOLUTE HUMIDITY, BY MONTHS, 1897.



[PLATE 977.]

TABLE V.—RELATIVE HUMIDITY.—Average per cent of Saturation of the Atmosphere with Vapor of Water for Months and Year 1897 at Eight Stations in Michigan; also average line for Eight Stations. Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M., by Observers* for the State Board of Health.

Stations in Michigan.*	Divisions of the State. †	Per Cent of Saturation.—Relative Humidity.													
		Year.		Months, 1897.											
		Norm. ‡	1897.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 stations §			78	83	82	81	77	76	76	76	77	73	77	80	83
Rockland.....	U. P.		¶					63	70	b	b	j	l	n	
Traverse City.....	N. W.	82 ¹⁶	83	a	98	g	e	k	h	j	72	72	81	f	89
Harrisville.....	N. E.	66 ³	68	a	52	55	59	71	74	73	78	75	73	76	69
Thornville.....	B. & E.	78 ²⁰	80	94	92	87	81	74	72	73	74	67	73	83	91
Agr'l College.....	C.	79 ³⁴	91	97	97	94	90	90	88	88	88	87	88	89	96
Lansing, S. B. of H. ¶	C.	72 ¹⁹	71	78	75	73	67	66	66	70	71	66	69	72	80
Ann Arbor.....	S. C.	79 ¹⁷	81	93	87	84	77	79	78	74	81	77	76	84	83
Battle Creek.....	S. C.		**	96	91	90	92	78	73	73	74	e	72	78	85
Tecumseh.....	S. C.	73 ⁴	76	a	72	80	77	73	a	75	75	a	76	71	80
Birmingham.....	S. E.	76 ¹¹	77	m	h	a	e	b	g	a	d	d	71	d	81
				78	76	80	78	78	78	77	76	72	78	80	78

NOTE.—The observations in Table V. were reduced by Guyot's table, in Smithsonian Meteorological Tables, or by a table substantially the same as that. Computations for Ann Arbor in 1897 were made by the observer there. All other computations in Table V. were made at the office of the State Board of Health.

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 4.

† The full names of the divisions, and the counties in each division are stated in Exhibit I, in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual relative humidity for periods of years ending in each case with December 31, 1897. The small figures above and at the right of the numbers which state the relative humidity, denote the number of years included in the average.

§ This line is an average for only the stations at which observations were made tri-daily and from which statements, nearly complete, were received for every month in the year. It does not include Rockland and Battle Creek.

¶ The average for 7 months is 74.

** For 11 months, 82.

¶ Beginning with the year 1885, allowance must be made for Lansing in Table V., because of a change in location of the instruments. The amount of the variation by months is shown in exhibit D, on page 23, Report for 1886.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

d For 92 observations.

b For 91 observations.

c For 90 observations.

e For 89 observations.

e For 88 observations.

f For 87 observations.

g For 86 observations.

h For 85 observations.

i For 84 observations.

j For 83 observations.

k For 82 observations.

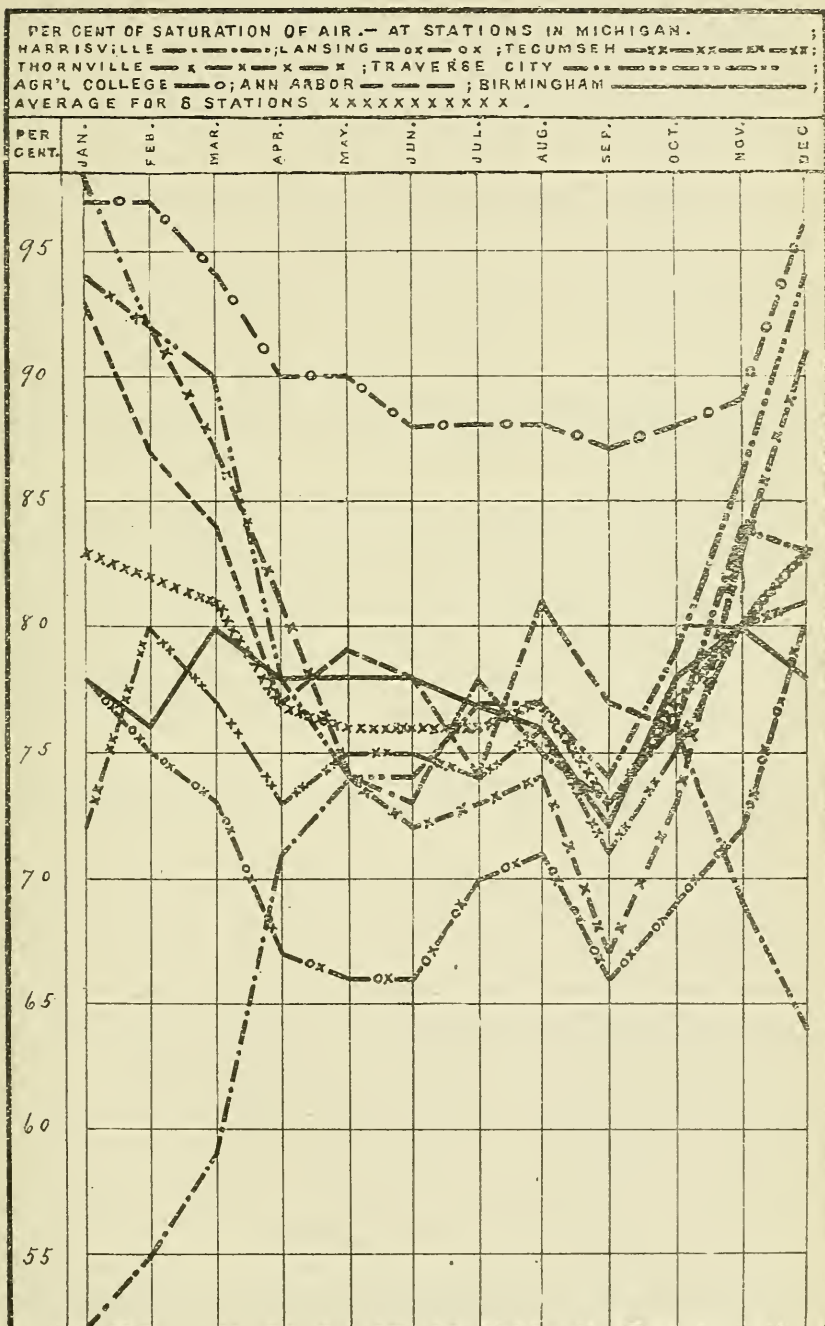
l For 81 observations.

m For 80 observations.

n For 79 observations.

Graphic representations of 9 representative lines in Table V. are given in Diagram IV.

DIAGRAM IV.—RELATIVE HUMIDITY, BY MONTHS, 1897.



FOGS.

For the year 1897, fog was reported at 127 morning observations, at 30 afternoon observations (at about 2 P. M.), at 42 evening observations (at about 9 P. M.), and 59 times during the day, no special time being mentioned, in many cases the same fog, or fog at the same time, being reported by different observers. Fog was reported, at one or more stations at some time during the day, on 91 days.

EXHIBIT 21.—*Number of different days on which Fog was observed at one or more of 15 Stations in Michigan* in 1897, and each month of the year 1897.*

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
91.	6	6	8	3	10	4	6	5	12	16	8	7

* This Exhibit contains statements only for those localities from which reports were received for every month of the year, as follows: Rockland, Marquette, Harrisville, Traverse City, Grand Haven, Port Huron, Battle Creek, Thornville, Agricultural College, Lansing, Ann Arbor, Parkville, Detroit, Birmingham and Tecumseh.

Exhibit 21, "Number of different days on which fog was observed," etc., supplies knowledge of the *time*, in each month, on which fog was observed, somewhere in Michigan. Exhibit 22, "Number of observations at which fog was observed," etc., supplies knowledge of the *time* combined with the *area* of the occurrences of fog. For the State as a whole, therefore, the last-mentioned exhibit supplies the most important information. Therefore, in this Report the diagram relative to fog is made to exhibit the facts contained in this last-mentioned exhibit. Heretofore it has represented the "Number of different days on which fog was observed at one or more stations in Michigan."

EXHIBIT 22.—*Number of observations at which Fog was observed in Michigan in 1897, and in each month of the year 1897. (Observations taken 3 times *daily, at 15 †Stations.)*

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec
199	5	13	40	3	7	3	4	5	13	56	20	30

* At the U. S. Weather Bureau Stations the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in Exhibit 23.

† This exhibit contains statements only for those localities from which registers were received for every month of the year; the localities are stated in a foot-note to Exhibit 21 above.

NOTE.—Graphic representations of statements in Exhibit 22 are given in Diagram V.

DIAGRAM V- CONCERNING FOGS IN MICHIGAN IN 1897.

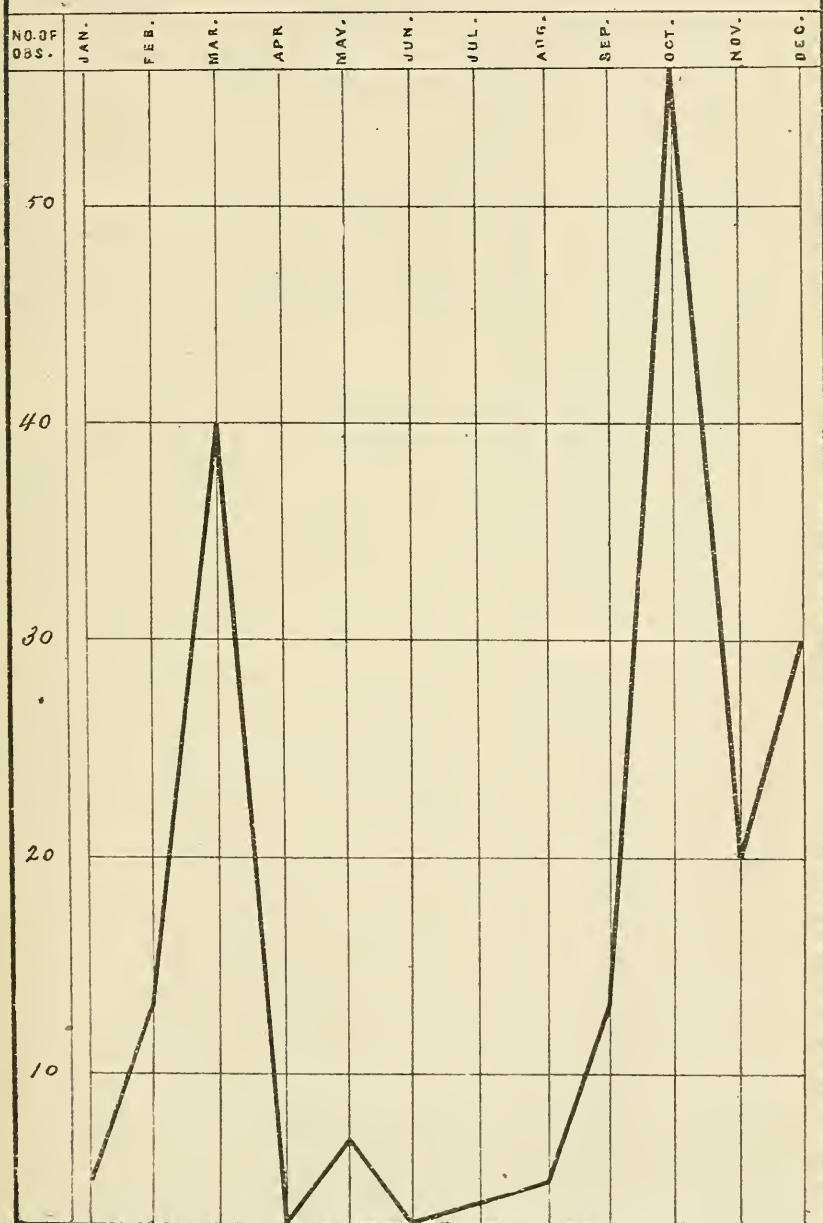
NUMBER OF OBSERVATIONS OF FOGS, AT ONE OR MORE OF
15 STATIONS IN MICHIGAN, BY MONTHS IN 1897.

EXHIBIT 23.—*Number of different days on which Fog was recorded in 1897, and stations in*

Stations in Michigan.*	No. of days in 1897.	January.			February.			Line number.
		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
			A. M.	P. M.		A. M.	P. M.	
Rockland.....	3	0			0			1
Marquette.....	9	2, 3			0			2
Traverse City.....	6	0			0			3
Harrisville.....	2	0			0			4
Grand Haven.....	18	17		{ 11:00 A. M. till 2:00. }	6		{ Early A. M. till 1:00. }	5
								6
Port Huron.....	37	1	{ Night of Dec. 31 till 9:00. }		8	{ Night of 7th till 11:00. }		7
					15, 16		{ 9:00 P. M. of 15th till 8:30 A. M. of 16th. }	8
					20		{ 7:00 till 9:00. }	9
								10
Thornville.....	10	0			0			11
	41	8	{ Early till 10:00. }		1	7:00	{ Early A. M. till 3:00. }	12
		31	{ Early till 10:00. }		6		{ Night of 5th till P. M. of 6th. }	13
								14
Lansing, S. B. of H.....					15		9:30 till 11:00.	15
								16
								17
Ann Arbor.....	12	0			0			18
								19
								20
								21
Battle Creek.....	16	22		Evening.	6	A. M.	P. M.	22
Parkville.....	23	0			6			23
								24
								25
								26

* The names of observers, their places of observation and the counties in which the places are situated are stated in Exhibit 1.

in each month, the dates and hours of observations† when Fogs were recorded at 15 Michigan.

Line number.	March.			April.			May.			June.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1	0			0			0			4		2:00
2	0			0			{ 11, 12, 19, 20			0		
3	0			0			13		9:00	24	7:00	
4	0			0			0			0		
5	5	{ Early till noon.	{ 6:00 P. M. of 8th till 3:00 P. M. of 9th.	24		{ 5:30 till 10:00	20		{ Noon till 3:30	{ 24	{ Early till noon	
6	8, 9											
7	5	{ Night of 4th till 10:30.	{ 4:00 P. M. of 8th till night of 10th.	0			2	{ Night of 1st till noon.	{ Noon till 2:00.	0		
8	8, 9, 10						4	{ Night of 3d till 8:30				
9	18	{ Night of 17th till 11:20.	{ 9:00				10	{ Night of 9th till 9:00.				
10	19	{ 6:00 P. M. of 18th till 10:00.										
11	9	7:00		0			0			0		
12	4		Night.	23		10:45*	2	{ Early till 11:00.		0		
13	5		{ Night of 4th till 1:30.	{ 24	{ Early morn- ing.							
14	8, 9		{ 5:30 P. M. of 8th till 2 P. M. of 9th.									
15	9		Night.†									
16	18	{ Night of 17th till 10:30.										
17	19		{ Night of 18th till night of 19th.									
18	5	7:00		0			0			0		
19	8		Evening.									
20	9	A. M.	P. M.									
21	18	7:00										
22	19		1:00 till 2:00									
23	17			0			23			0		
24	18	A. M.	Evening.									
25	5, 9			8			16, 23			9, 30		
26	18		Night.									

* Lifted in night.

† At the U. S. Weather Bureau Stations during 1897, the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in this exhibit.

‡ Formed and lifted in night.

EXHIBIT 23.—CONTINUED.—*Dates when*

Stations in Michigan.*	No. of days in 1897.	January.			February.			Line number.
		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
			A. M.	P. M.		A. M.	P. M.	
Tecumseh.....	11	1	7:00	-----	0	-----	-----	27
								28
								29
								30
								31
Birmingham.....	11	0	-----	-----	0	-----	-----	32
Detroit.....	1	0	-----	-----	0	-----	-----	33
Agricultural College.....	8	0	-----	-----	0	-----	-----	34

Fogs were recorded in 1897.

Line number.	March.			April.			May.			June.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
27	5, 9	7:00		0			0			0		
28	8		9:00									
29	17		9:00									
30	18	7:00	9:00									
31	19		2:00 & 9:00									
32	9	7:00		8, 24	7:00		0			0		
33	0			0			0			0		
34	0			0			0			0		

EXHIBIT 23.—CONTINUED.—*Dates when*

Stations in Michigan.	July.		August.			September.			Line number.	
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
		A. M.	P. M.		A. M.	P. M.		A. M.		P. M.
Rockland.....	26		9:00	0			0			1
Marquette.....	9			0			0			2
Traverse City }	0			0			0			3
										4
Harrisville.....	0			0			0			5
	0			0			0			6
										7
										8
Grand Haven }										9
										10
										11
	0			9	Night of 8th till 9:00		5	Night of 4th till 7:00		12
				24	Night of 23d till 7:00		6	Night of 5th till 7:00		13
				28	Night of 27th till 7:00		29	Night of 28th till 9:00		14
										15
Port Huron.....										16
										17
										18
										19
										20
Thornville.....	18	Morning		0			0			21
	20	Morning								22

Fogs were recorded in 1897.

Line number.	October.			November.			December.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
1	6	-----	9:00	0	-----	-----	0	-----	-----
2	20, 21	-----	-----	0	-----	-----	0	-----	-----
3	27	7:00	-----	15	7:00	-----	9	-----	9:00
4							10	7:00	-----
5	26, 27	-----	-----	0	-----	-----	0	-----	-----
6	23	{ Night of 22d till 9:00 }	-----	15	{ Night of 14th till 11:00 }	-----	9	-----	{ 4:00 till 10:00 }
7	24	{ Night of 23d till 11:00 }	-----	26	{ Night of 25th till 9:00 }	-----	10	-----	{ 3:30 till 6:00 }
8	25	{ Night of 24th till 8:30 }	-----						
9	26	{ Night of 25th till 11:30 }	-----						
10	27	{ Night of 26th till 10:00 }	-----						
11	31	{ Night of 30th till 9:30 }	-----						
12	4	{ Night of 3d till 9:00 }	-----	1	{ Night of Oct. 31 till 9:30 }	-----	9	-----	{ Night of 8th till 9:00 }
13	13	{ Night of 12th till 8:30 }	-----	8	-----	{ Night of 7th till 6:00 }	10	-----	{ 5:00 till midnight }
14	22	-----	{ 10:00 till midnight }	15	-----	{ Night of 14th till 9:00 }	11	A. M.	P. M. *
15	23	A. M. { Noon till 2:00 6:30 till midnight }		25	-----	{ 5:00 till midnight }	20	{ Night of 19th till 9:00 }	-----
16	24	{ Early till 9:00 }	-----						
17	25	-----	{ Night of 24th till 2:30 }						
18	26	{ Night of 25th till 11:00 }	{ 7:30 till midnight }						
19	27	-----	{ 12 P. M. of 26th till 2:00, 6:00 till midnight }						
20	28	{ Early till 9:00 }	-----						
21	2	Morning	-----	0	-----	-----	4	A. M.	P. M.
22	23, 24, 25, 26, 27	{ Early till 10:00 }	-----						

* Lifted in night.

EXHIBIT 23.—CONCLUDED.—*Dates when*

Stations in Michigan.	July.		August.			September.			Line number.	
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		
		A. M.	P. M.		A. M.	P. M.		A. M.		P. M.
Lansing, S. B. of H.	16		9:00*	24		9:00	2	Night of 1st till 10:30		23
	20	Night of 19th till 8:00	{				3	Night of 2nd till 8:30		24
				4	Night of 3d till 7:00		25			
				12	Night of 11th till 8:30		26			
	20			.	9:00*	27				
		23	Night of 22d till 9:00		28					
		28	Night of 27th till 7:30		29					
		28	Night of 27th till 7:00		30					
						31				
										32
Ann Arbor...	0			0			0			33
Battle Creek	0			0			4, 23, 24			34
Parkville.....	6	Morning		23, 30	Morning		3, 4			35
Tecumseh.....				23	9:00		0			36
										37
										38
										39
Birmingham...	0			0			4	7:00		40
										41
										42
										43
Detroit.....	0			0			25	{ Early till 9:00	{	44
Agri'l College	20	7:00		0			23	7:00	{	45

* Lifted in night.

Fogs were recorded in 1897.

Line number.	October.			November.			December.		
	Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.		Day of Month.	Hour of Observation.	
		A. M.	P. M.		A. M.	P. M.		A. M.	P. M.
23	2	{ Night of 1st till 9:00	{ -----	1	{ 7:50 till 11:00	{ -----	9	10:30*	2:00 & 9:00
24	3	{ Night of 2nd till 8:00	{ -----	8	{ Early till 11:00	{ -----	14	{ Night of 13th till noon	{ -----
25	4	{ Night of 3d till 7:00	{ -----	15	{ Night of 14th till 10:30	{ -----			
26	13	{ Night of 12th till 8:00	{ -----						
27	20	{ Night of 19th till 8:20	{ -----						
28	23	{ Night of 22d till 11:30	{ -----						
29	24	{ Night of 23d till 10:45	{ -----						
30	25	{ Night of 24th till 9:00	{ -----						
31	26	{ Night of 25th till noon	9:00						
32	27	{ Night of 26th till 11:00	{ -----						
33	23	7:00	-----	14, 25	-----	9:00	9	7:00	2:00 & 9:00
34	26, 27	7:00	-----				14	7:00	-----
35	2, 3, 6, 23, 24, 25, 26, 27	{ -----	-----	15	7:00	-----	0	-----	-----
36	23, 24, 25,	{ -----	-----	8, 15	-----	-----	9	A. M.	P. M.
37	26, 27	{ -----	-----				14		
38	19	-----	9:00	14	-----	9:00	9	7:00	2:00
39	{ 23, 24 }	7:00	-----	15, 16	7:00	-----			
40	{ 26, 27 }	-----	-----	17	7:00	9:00			
41	24, 25, 26, 27	7:00	-----	0	-----	-----	8	7:00	-----
42							9	7:00	2:00
43							20	-----	2:00
44	0	-----	-----	0	-----	-----	0	-----	-----
45	{ 3, 20, 23, 24, 26, 27 }	7:00	-----	0	-----	-----	0	-----	-----

* Lifted in night.

NOTE.—Registers were received, but with no fog recorded thereon, from Sault Ste. Marie and Alpena for each month in 1897. A cipher (0) indicates that a monthly register was received from the station with no fog recorded thereon.

TABLE VI.—Average Per Cent of Cloudiness for Months and Year 1897, at 10 Stations in Michigan; also Average Line for 10 Stations. Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M., by Observers* for the State Board of Health.

Stations in Michigan.*	Divi- sions of the State.†	Average Per Cent of Cloudiness.													
		Year.		Months, 1897.											
		Norm. ‡	1897.	Jan.	Feb.	Mar	Apr	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 10 Sta- tions.§			57	78	78	62	60	52	48	40	40	30	46	71	82
Rockland	U. P.	57 ²	59	a 84	k 72	51	41	46 n	52 j	c 45	d 42	o 45	p 75	77	a 82
Traverse City.....	N. W.	59 ¹⁶	58	86	74	67	55	60	43	m 35	37	e 34	43	74	b 92
Harrisville.....	N. E.	61 ¹³	70	86	80	73	66	69	61	54	54	47	72 e	80	97
Thornville	B. & E.	51 ²¹	54	70	81	57	58	51	46	36	35	22	38	67	82
Agr'l College.....	C.	60 ³⁴	52	73	80	65	65	49	52	32	29	19	30	63	72
Lansing S.B. of H.	C.	57 ¹⁹	60	79	83	65	70	53	53	47	43	29	45 e	72 e	85 d
Ann Arbor.....	S. C.	56 ¹⁸	54	73	75	57 b	59	51 a	43	39	40	28 d	43	68 f	74
Battle Creek.....	S. C.	50 ⁷	54	80 a	80	67 h	59	41 b	39	29	41	26	34 a	65 h	84 b
Tecumseh.....	S. C.	46 ⁴	50	75 n	73 m	54 f	57 i	49 g	40 g	36 h	33 h	12 l	34 b	64 h	68 e
Birmingham.....	S. E.	59 ¹¹	60	73	78	66	70	54	46	47	47	33	45	76	86

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit I.

† The full names of divisions and the counties in each division are stated in Exhibit I, in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average per cent of cloudiness for periods of years ending in each case with December 31, 1897. The small figures above and at the right of numbers which state the per cent of cloudiness, denote the number of years included in the average.

§ This line is an average for all the stations at which tri-daily observations were made, and from which statements, nearly complete, were received for every month of the year.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

- a For 92 observations.
- b For 91 observations.
- c For 90 observations.
- d For 89 observations.
- e For 88 observations.
- f For 87 observations.
- g For 86 observations.
- h For 85 observations.
- i For 84 observations.
- j For 82 observations.
- k For 80 observations.
- l For 79 observations.
- m For 76 observations.
- n For 72 observations.
- o For 68 observations.
- p For 61 observations.

Graphic representations of 11 representative lines in Table VI. are given in Diagram VI.

DIAGRAM VI.—AV. PER CENT OF CLOUDINESS, BY MONTHS 1897.

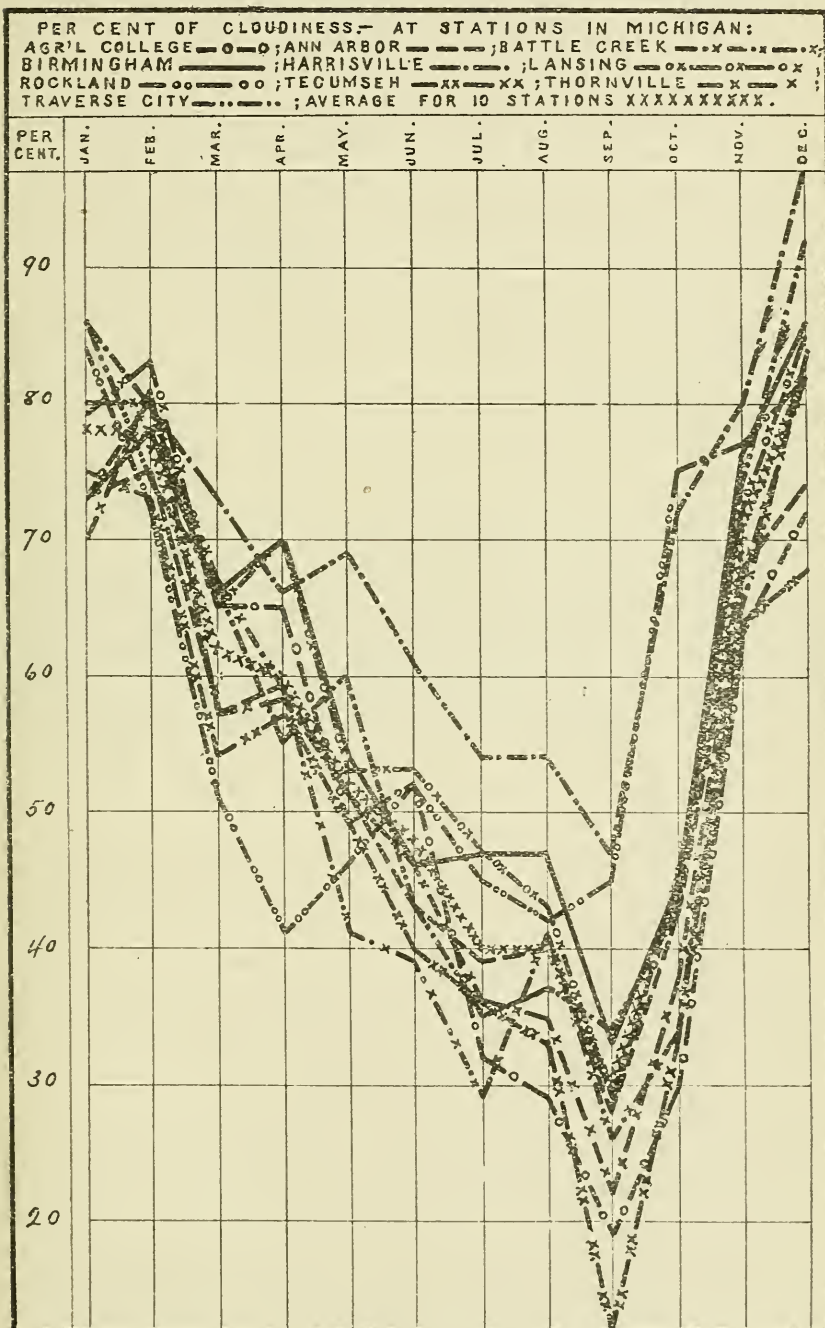


EXHIBIT 24.—Average Per Cent of Cloudiness, by Year and Months in 1897, Compared with Annual and Monthly Averages for 1896, and for 20 years, 1877-96. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Per Cent of Cloudiness.												
	Annual Av.	Jan.	Feb.	Mar.	A r.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 20 yrs., 1877-96*	56	71	64	57	52	50	47	40	42	45	56	70	78
1896 (10 stations)...	56	79	65	52	52	41	39	48	41	61	50	77	71
1897 (10 stations)...	57	78	78	62	60	52	48	40	40	30	46	71	82
In 1897 Greater than av. for 20 years, 1877-96	1	7	14	5	8	2	1	0	-----	-----	-----	1	4
In 1897 Less than av. for 20 years, 1877-96.....	-----	-----	-----	-----	-----	-----	-----	-----	2	15	10	-----	-----
In 1897 Greater than in 1896.....	1	-----	13	10	8	11	9	-----	-----	-----	-----	-----	11
In 1897 Less than in 1896.....	-----	1	-----	-----	-----	-----	-----	8	1	31	4	6	-----

* Mendon for 1877-83; Nirvana for 1877-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Niles for 1878-81; Benton Harbor for 1877-78 and 1880; Coldwater. Woodmere Cemetery for 1877-79; Otisville for 1878-80, 1882; Washington for 1879-83; Ypsilanti for 1877, 1879; Petoskev for 1878-79; Fife Lake for 1877; Ionia for 1880, 1883-85; Adrian for 1880; Hillsdale for 1880, 1882-84; Parkville for 1881-82; Winfield for 1881, 1883; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Hastings for 1882; Port Austin for 1883; Manistique. Swartz Creek for 1884-85; Mackinaw City for 1884-87; Pentwater, East Saginaw for 1886; Kalamazoo for 1877-89; Marquette for 1879-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877, 1879-87; Otsego for 1886-87, 1890; Gulliver Lake for 1887-90, 1892; Marshall for 1881-92; Albion for 1880-91; Alma for 1890; Tecumseh for 1877-85, 1894-96; Thornville for 1877-96; Battle Creek for 1877-80, 1882-85, 1888-89, 1891-96; Lansing for 1879-96; Agricultural College for 1877, 1881-93; Ann Arbor for 1880-96; Harrisville for 1882, 1885-96; Traverse City for 1882-96; Birmingham for 1887-93; Rockland for 1891-92, 1896.

EXHIBIT 25.—*Comparison of the Average Per Cent of Cloudiness for the Year, and for each Month of the Year 1897, with Averages for the 33 Years, 1864-96, and for the Year 1896. Observations made at 7 A. M., 2 P. M. and 9 P. M., Daily by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich*

Years, etc.	Per Cent of Cloudiness.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 33 yrs., 1864-96.	57	72	65	61	56	51	49	44	45	47	57	67	74
1896.....	56	76	67	52	46	41	44	53	45	60	42	71	74
1897.....	52	73	80	65	65	49	52	32	29	19	30	73	72
In 1897 Greater than av. for 33 years, 1864-96.....		1	15	4	9		3					6	
In 1897 Less than av. for 33 years, 1864-96.....	5					2		12	16	28	27		2
In 1897 Greater than in 1896.....			13	13	19	8	8					2	
In 1897 Less than in 1896.....	4	3						21	16	41	12		2

EXHIBIT 26.—*Dates of Auroras observed and recorded at 5 stations in Michigan during the year 1897.*

Stations.	Dates of Auroras recorded in 1897.											
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Marquette.....		22	10	1			30					
Sault Ste. Marie.....						27		2				
Traverse City.....				1								
Thornville.....				1		1	1					
Lansing, S. B. of H.....					1							

EXHIBIT 27.—*Dates of Solar and Lunar Halos*

Line Number.	Stations.	Dates of Halos Recorded,									
		January.		February.		March.		April.		May.	
		Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.
1	Marquette.....					7, 31		31			
2	Sault Ste. Marie.....						12				
3	Thornville.....										
4	Lansing, S. B. of H....		12	{ 1, 5, 17, 18, 19, 21 }		{ 1, 13, 17, 21, 30 }	{ 13 }	{ 1, 8, 12, 18 }	12		
5	Parkville.....	27	13						12	27	

Parhelia, Apr. 7, May 25, Nov. 28.—*Rockland.* Jan. 7, 14, 28, 31; Feb. 1, 12, 19, 26; Mar. 7, 11, 21; Apr. 8; Nov. 6.—*Parkville.*

EXHIBIT 28.—*Inches of Rain and Melted Snow, by Year and Months in 1897, compared with Annual and Monthly Averages for 1896, and for the 20 years, 1877-96. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Inches of Rain and Melted Snow.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 20 yrs., 1877-96*	34.56	2.22	2.39	2.14	2.56	3.58	3.68	3.00	3.05	3.17	3.04	3.13	2.62
1896 (16 stations)---	32.65	1.61	1.34	1.29	2.91	3.14	3.13	4.25	3.95	4.92	1.80	3.38	0.92
1897 (16 stations)---	32.15	3.64	1.28	3.04	2.72	3.74	2.50	3.63	2.44	1.13	2.39	3.32	2.33
In 1897 Greater than av. for 20 years, 1877-96-----		1.42		.90	.16	.16		.63				.19	
In 1897 Less than av. for 20 years, 1877-96-----	2.41		1.11				1.18		.61	2.04	.65		.29
In 1897 Greater than in 1896-----		2.03		1.75		.60					.59		1.41
In 1897 Less than in 1896-----	.50		.06		.19		.63	.62	1.51	3.79		.06	

* Benton Harbor for 1877-78; Mendon for 1877-78, 1880-82; Niles for 1878-81; Nirvana for 1877-79, and to and including April 25, 1880; Reed City from April 26 to December 31, inclusive, in 1880, and for 1881-85; Coldwater, Woodmere Cemetery for 1877-79; Otisville for 1878-80, 1882; Escanaba for 1880-87; Washington for 1880-83; Fife Lake, Ypsilanti for 1887; Winfield for 1881-83; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Ionia for 1883-84; Manistique, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Pentwater, East Saginaw for 1886; Gulliver Lake for 1887-90, 1892; Otsego, Alma for 1890; Hudson for 1886, 1888-89; Manistee for 1889-92; Albion for 1890-91; Marshall for 1881-84, 1886-93; Kalamazoo for 1877-90, 1892-94; Rockland for 1891, 1896; Tecumseh for 1877, 1878, 1880-85, 1894-96; Thornville, Detroit for 1877-96; Agricultural College for 1877-78, 1881-96; Marquette for 1879-84, 1886-96; Alpena, Port Huron for 1879-96; Grand Haven for 1879-88, 1890-96; Lansing for 1880-96; Harrisville for 1881-82, 1887-96; Ann Arbor for 1881-82, 1885-86, 1888-96; Traverse City for 1882-96; Parkville for 1882-83, 1884-96; Birmingham for 1887-96; Sault Ste Marie for 1892-96.

Recorded on the Monthly Registers in 1897.

Months, 1897.

June.		July.		August.		September.		October.		November.		December.		Line Number.
Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	Solar.	Lunar.	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4	-----	-----	3
1, 7, 23	-----	25	-----	17, 22	-----	21	-----	14, 16, 27	4, 15	17, 18	4, 9, 13	-----	7, 8	4
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	4	-----	-----	5

June 1, 9; July 2; Aug. 17; Oct. 14; Dec. 3, 22; Lunar corona, Jan. 12; Oct. 13, 14.—*Lansing.* Parhelia,

EXHIBIT 29.—*Comparison of the Rainfall during the Year and during each month of the Year 1897, with that for the Year 1896, and with the Average for the 33 Years, 1864-96. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

Years, etc.	Inches of Rain and Melted Snow.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 33 yrs., 1864-96.	30.90	1.73	1.92	2.28	2.39	3.23	3.86	3.11	2.83	2.85	2.42	2.33	1.95
1896.....	35.30	0.79	1.51	1.31	2.77	3.14	2.60	6.73	4.73	6.73	1.06	3.13	0.80
1897.....	33.61	4.17	0.67	2.08	2.74	3.29	2.57	8.49	1.69	0.80	2.15	2.94	2.02
In 1897 Greater than av. for 33 years, 1864-96.....	2.71	2.44	-----	-----	.35	.06	-----	5.38	-----	-----	-----	.61	.07
In 1897 Less than av. for 33 years, 1864-96.....	-----	-----	1.25	.20	-----	-----	1.29	-----	1.14	2.05	.27	-----	-----
In 1897 Greater than in 1896.....	-----	3.38	-----	.77	-----	.15	-----	1.76	-----	-----	1.09	-----	1.22
In 1897 Less than in 1896.....	1.69	-----	.84	-----	.03	-----	.03	-----	3.04	5.93	-----	.19	-----

TABLE VII.—*Inches of Rain and Melted Snow for Months and Year 1897, at 16 Stations in Michigan; also Average Line for 16 Stations,—as compiled from daily observations made by Observers* for the State Board of Health, and for the U. S. Weather Bureau.*

Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics.)	Divi- sions of the State. †	Inches of Rain and Melted Snow.													
		Year.		Months, 1897.											
		Norm. ‡	1897.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 16 Sta- tions§			32.15	3.64	1.28	3.04	2.72	3.74	2.50	3.63	2.44	1.13	2.39	3.32	2.33
Rockland	U. P.	27.45 ²	26.02	4.90	1.30	1.50	1.05	2.70	2.20	3.60	2.10	1.70	1.90	1.56	1.51
Marquette	U. P.	31.68 ¹²	29.84	2.98	1.66	1.29	2.06	1.89	3.45	3.04	2.83	1.97	2.68	1.22	1.77
Sault Ste. Marie ..	U. P.	34.92 ⁶	36.16	4.02	0.94	2.10	3.32	4.26	2.57	4.03	2.36	1.34	4.48	4.01	2.73
Traverse City.....	N. W.	37.03 ¹⁶	33.58	4.62	1.95	2.73	3.94	2.74	2.31	1.95	2.42	2.62	3.01	2.06	3.20
Alpena ..	N. E.	34.89 ²⁵	32.59	3.00	1.09	2.11	4.59	5.43	1.62	3.81	1.77	0.87	4.33	1.50	2.47
Harrisville	N. E.	33.44 ¹¹	36.38	3.00	1.54	4.08	4.46	4.67	1.31	3.46	2.99	1.05	4.03	2.28	3.51
Grand Haven.....	W.	34.74 ⁷	32.32	7.99	1.12	3.21	3.12	1.18	2.61	3.03	2.01	1.44	1.28	2.59	2.74
Port Huron.....	B. & E.	31.68 ²³	32.06	2.50	1.40	3.43	1.96	4.32	2.70	3.51	2.31	0.51	2.25	4.90	2.27
Thornville	B. & E.	32.49 ²¹	27.66	2.38	1.34	2.98	1.18	5.15	1.59	3.56	1.47	0.62	1.67	3.39	2.33
Agr'l College.....	C.	30.97 ³⁴	33.61	4.17	0.67	2.08	2.74	3.29	2.57	8.49	1.69	0.80	2.15	2.94	2.02
Lansing, S. B. of H.	C.	33.13 ¹⁸	34.38	3.72	0.68	3.54	2.40	3.22	3.49	7.32	1.90	0.92	2.29	3.13	1.77
Ann Arbor.....	S. C.	29.98 ¹⁰	32.49	2.80	1.46	3.40	3.07	4.74	2.69	1.66	2.88	1.35	1.65	4.79	2.00
Parkville.....	S. C.	41.30 ¹⁷	34.57	5.26	1.40	3.84	2.77	3.74	1.96	3.95	1.25	0.73	2.29	4.75	2.63
Tecumseh.....	S. C.	30.06 ⁴	31.17	2.76	1.48	3.34	2.08	3.69	2.58	1.72	4.33	0.59	1.49	5.22	1.89
Birmingham.....	S. E.	30.26 ¹¹	31.27	2.47	1.32	2.25	2.67	4.78	2.73	3.22	3.62	0.55	1.47	3.64	2.55
Detroit.....	S. E.	32.61 ²⁶	30.34	1.65	1.14	3.70	2.09	4.03	3.52	1.70	3.10	1.02	1.31	5.13	1.95

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1.

† The names of divisions, and the counties in each, are stated in Exhibit I, in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the annual average rainfall for periods of years ending in each case with December 31, 1897. The small figures above and at the right of numbers which state the rainfall denote the number of years included in the average.

§ This line is an average for all the stations, from which statements are given for every month of the year.

NOTE.—The computations of amount of rainfall were furnished by the observers at Detroit, Alpena, Grand Haven, Port Huron, Ann Arbor, Sault Ste. Marie and Marquette for the year. All other computations in Table VII. were made in the office of the Secretary of the State Board of Health.

The lines for 10 representative stations in Table VII. are graphically represented in Diagram VII.

DIAGRAM VII.—RAINFALL, BY MONTHS, 1897.

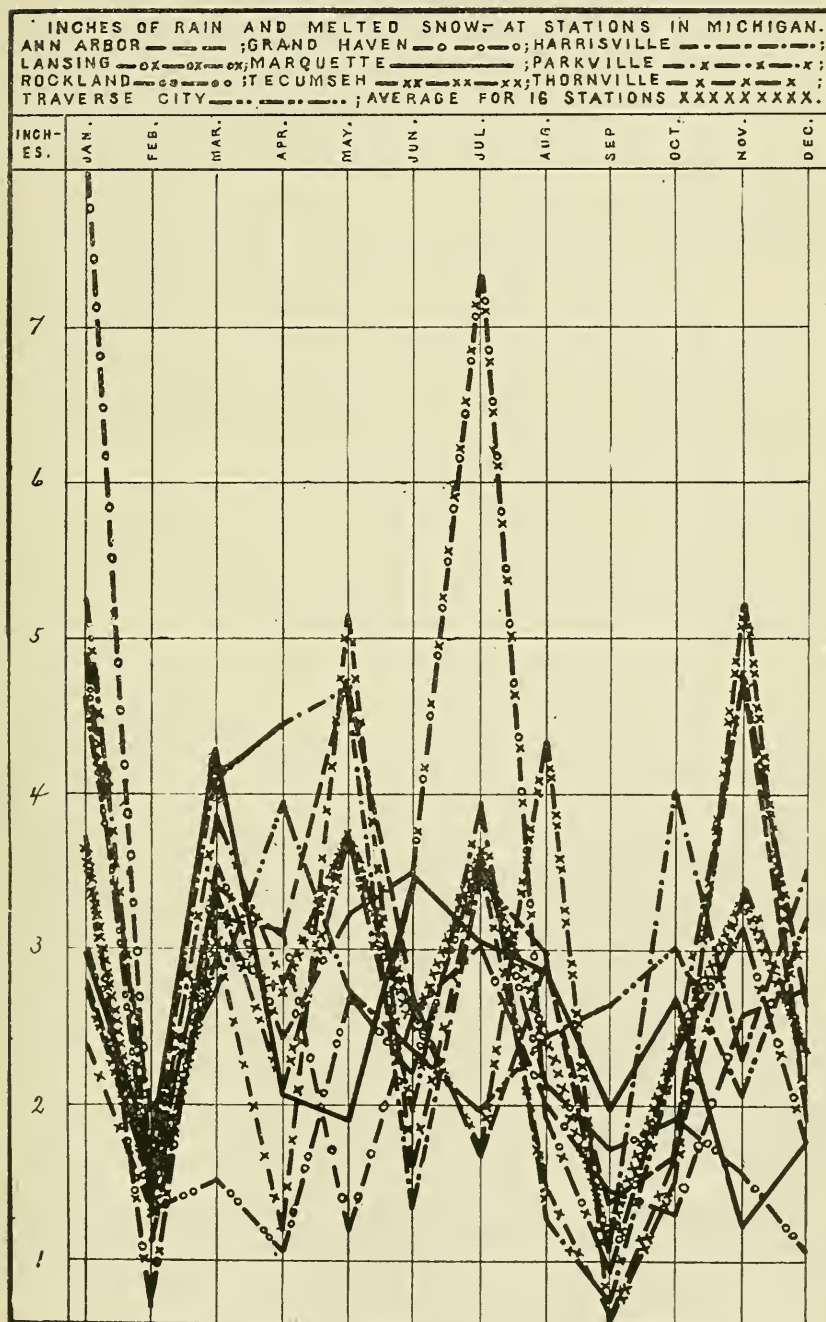


TABLE VIII.—*Relative amount of Ozone in the Atmosphere by Day, for Months and Year 1897, at 10 Stations, also Average lines for 8 stations and for 2 Stations in Michigan, as indicated by averages of observations made daily by exposing Test-paper prepared according to Schönbein's formula, from 7 A. M. to 2 P. M.—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10) by Observers for the State Board of Health, and for the U. S. Weather Bureau.**

Stations in Michigan.† (Those of the U.S. Weather Bureau in Italics.)	Divi- sions of the State. †	Degrees of Coloration of Test-paper.—Day Observation.**													
		Year.		Months, 1897.											
		Norm. + 1897.	1897.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	i Nov.	Dec.
Av. for 8 Stations. §		-----	3.67	4.32	4.29	4.13	3.79	4.08	3.73	3.02	3.96	2.64	2.97	3.34	3.73
Av. for 2 Stations. ¶		-----	2.93	2.02	2.37	2.49	2.96	3.30	3.71	3.03	3.70	3.23	2.79	2.72	2.88
Rockland.....	U. P.	5.45 ⁴ 16	5.28	6.51	6.03 ^c	6.15 ^a	5.80	6.38 ^e	5.07 ^b	3.98 ^e	5.85 ^a	3.26 ^g	4.76 ^f	4.49 ^b	5.12 ^d
Traverse City....	N. W.	5.15 ¹³	6.57	6.54	6.58	6.57	6.44	6.83 ^e	7.08 ^b	6.35 ^e	7.47	6.01	6.17 ^a	6.41	6.44
Harrisville	N. E.	3.73	2.54	3.12	2.79	2.47	2.40	2.70	2.57	1.92	2.92	1.81	2.34	2.38	3.11
Grand Haven.....	W.	-----	3.98	3.22	3.58	4.15	4.27	4.00	4.57	3.88	4.08	4.08	3.79	4.16	4.00
Port Huron.....	B. & E.	----- ²¹	1.88	0.83	1.15	0.82	1.64	2.60	2.84	2.17	3.31	2.38	1.79	1.28	1.76
Thornville.....	B. & E.	3.13 ¹⁹	4.31	6.12	5.61	5.34	3.70	3.47	2.90	3.11	3.43	2.64	4.01	5.11	6.27
Lansing, S.B. of H.	C.	3.04	2.12	2.54	1.79	1.44	1.84	2.96	2.57 ^c	2.27	2.89	1.61	1.50	2.21	1.76
Adrian.....	S. C.	----- ⁵	-----	3.93	4.43	4.12	2.97	2.93	1.08	-----	-----	-----	-----	-----	-----
Ann Arbor.....	S. C.	2.66 ⁴	1.60	1.28	2.00	2.50	2.07	1.83	1.77	0.98	2.08	1.24	0.98	1.28 ^d	1.24
Battle Creek.....	S. C.	2.71 ⁴	2.58	3.60	4.33	3.41	3.37	3.38	3.70	1.88 ^a	2.47	1.14	0.50	1.25 ^d	1.98
Tecumseh.....	S. C.	4.51	4.32	4.83	5.22	5.12	4.70	5.05	4.20 ^b	3.67 ^a	4.60	3.44	3.50	3.61	3.89
Birmingham.....	S. E.	-----	††	-----	-----	2.73	2.70	3.00	2.60	2.11	2.89 ^b	1.78	1.76	2.31	2.63

* At the stations of the U. S. Weather Bureau during the year 1897, the observations were made by exposing the test-paper from 8 A. M. to 8 P. M., all 75th Meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table II.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit I. The full names of the divisions and counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual relative amount of ozone by day for periods of years ending in each case with December 31, 1897. The small figures above and at the right of numbers which state the average denote the number of years included in the average.

§ This line is an average for only the stations from which statements nearly complete were received for every month in the year. It does not include Adrian, Birmingham and the Weather Bureau Stations.

¶ This is an average line for Grand Haven and Port Huron.

§ The average for 6 months is 3.24. †† For 10 months, 2.45.

** Allowance has been made for difference in sensitiveness of test-paper. See "i" below.

a, b, c. In the columns from January to December, inclusive, the a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 27 days. d For 26 days. e For 24 days. f For 23 days. g For 19 days.

i CONCERNING OZONE CORRECTIONS.—It is now believed that the correction (for variation in sensitiveness of different lots of test-paper) applied to the monthly averages in the tables for the day and the night ozone, for the month of November in each of the years 1891, 1892 and 1893, at stations in Michigan and at Lansing, was .39 too great for the day (7 A. M. to 2 P. M.) and .54 for the night ozone (9 P. M. to 7 A. M.). This should be taken into consideration in studying the tables relative to ozone in the Annual Reports of this Board for those years.

Nine lines in this table are represented in Diagram VIII.

DIAGRAM VIII.—OZONE, AV. BY DAY, MONTHS IN 1897.

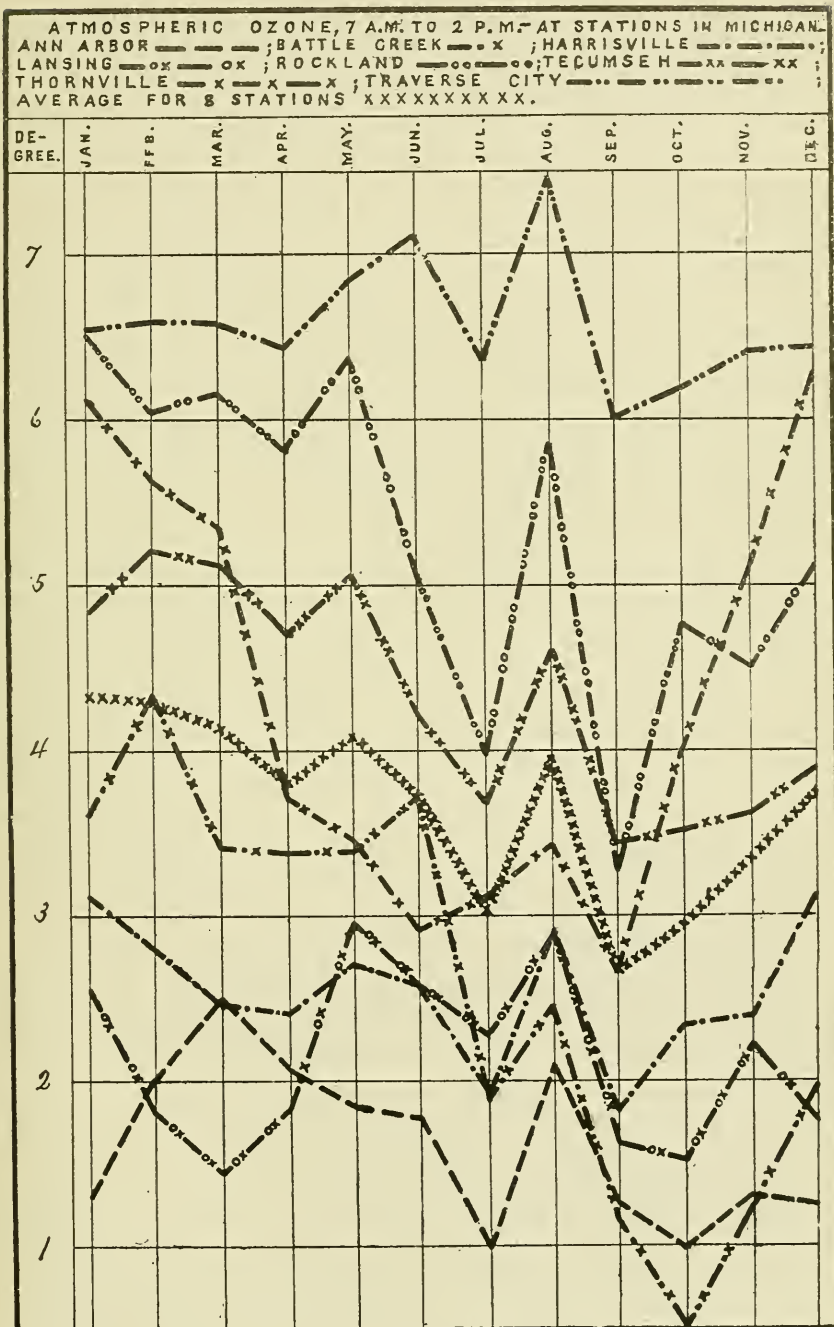


TABLE IX.—*Relative Amount of Ozone in the Atmosphere at Night for Months and Year 1897, at 10 Stations, also Average Line for 8 Stations and for 2 Stations in Michigan—as indicated by Averages of Observations made Nightly by exposing Test-paper, prepared according to Schönbein's formula, from 9 P. M. to 7 A. M.—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10), by Observers for the State Board of Health, and for the U. S. Weather Bureau.**

Stations in Michigan. † (Those of the U. S. Weather Bureau in Italics.)	Divi. sions of the State. ‡	Degrees of Coloration of Test-paper.—Night Observations.**													
		Year.		Months. 1897.											
		Norm. §	1897.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 Stations			4.10	4.22	4.80	4.73	4.26	4.58	4.23	3.67	4.32	3.04	3.17	3.77	4.41
Av. for 2 Stations			3.41	2.50	3.32	2.71	3.42	3.72	4.23	3.45	4.57	3.37	3.11	3.04	3.48
Rockland	U. P.	6.14 ⁴	5.94	6.54	7.00 ^e	6.99	6.07	6.86	6.04	5.22	6.46	4.46 ^h	5.09 ^g	4.51 ^b	5.98 ^f
Traverse City	N. W.	5.13 ¹⁶	6.65	6.28	6.58 ^d	6.75 ^b	6.60	6.99 ^f	6.99 ^c	7.01 ^f	7.40 ^a	6.04	5.91	6.36	6.93
Harrisville	N. E.	4.21 ¹³	2.99	2.92	3.37	3.15	3.00	3.02	2.84	2.64	3.23	2.34	2.78	2.86	3.73
Grand Haven	W.		4.92	4.34	5.26	4.84	5.00	4.97	5.58	5.05	5.65	4.53	4.46	4.28	5.02
Port Huron	B. & E.		1.90	0.66	1.37	0.57	1.84	2.47	2.88	1.84	3.49	2.21	1.75	1.80	1.93
Thornville	B. & E.	3.90 ²¹	5.63	6.60	7.26	6.99	5.87	5.77	4.94	3.87	4.72	3.41	4.40	6.46	7.25
Lansing, S. B. of H.	C.	3.39 ¹⁹	2.50	2.21	2.58	2.89	2.54	3.44	2.84 ^d	2.19	3.30	1.54	1.49	2.86	2.15
Adrian	S. C.		††	4.31	5.04	4.47	3.74	3.12	1.77						
Ann Arbor	S. C.	2.52 ⁵	1.63	1.12	2.11	2.54	2.17	2.02	1.78	0.96	1.88	1.28	0.72	1.30	1.70
Battle Creek	S. C.	2.50 ⁴	2.21	3.05	3.62	2.31	2.04	2.64	2.98	2.32 ^a	1.88	1.01	0.85	1.28	2.57
Tecumseh	S. C.	5.40 ⁴	5.23	5.02	5.87	6.18	5.80	5.90	5.41 ^d	5.11	5.65	4.24	4.14	4.53	4.93
Birmingham	S. E.		††			2.67	2.77	2.71	3.07	2.48	3.27	1.94	2.07	2.06	2.80

* At the U. S. Weather Bureau Stations during the year 1897, the observations were made by exposing the test-paper from 8 P. M. to 8 A. M., 75th meridian time. The corresponding local time for some of these stations is stated in a foot-note to Table II.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1.

‡ The full names of the divisions and the counties in each division are stated in Exhibit I, in a paper which follows, on weekly reports of sickness.

§ Numbers in this column state the average annual relative amount of ozone by night for periods of years ending in each case with December 31, 1897. The small figures above and at the right of the numbers which state the average denote the number of years included in the average.

|| This line is an average for only the stations from which statements, nearly complete, were received for every month in the year. It does not include Birmingham, Adrian and the U. S. Weather Bureau Stations.

¶ This is an average line for Grand Haven and Port Huron.

** Allowance has been made for difference in sensitiveness in test-paper. See "i" foot-note, Table VIII.

†† The average for 6 months is 3.74. ‡‡ For 10 months, 2.58.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days. h For 19 days.

Nine lines in this table are graphically represented in Diagram IX.

DIAGRAM IX- OZONE, AV. BY NIGHT, MONTHS IN 1897.

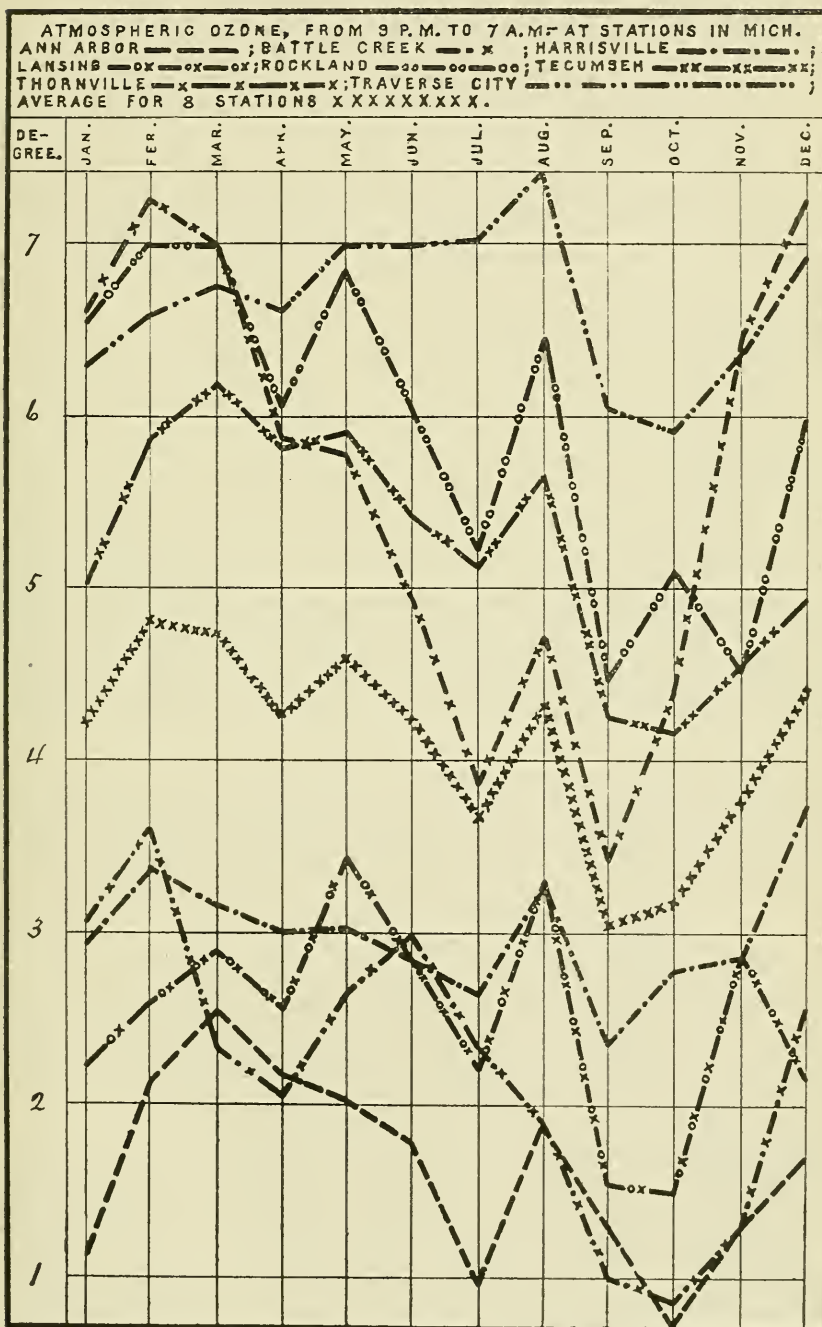


EXHIBIT 30.—Average Amount of Atmospheric Ozone (Day), by Year and Months, in 1897, compared with Annual and Monthly Averages for 1896, and for the 20 Years, 1877-96. These Averages are for Groups of Several Stations in Michigan.

Years, etc.	Ozone by Day.—Degrees of Coloration of Test-paper.*												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 20 years, 1877-96†	3.47	3.68	3.79	3.82	3.63	3.72	3.48	3.03	3.43	3.16	3.18	3.22	3.49
1896 (9 stations)----	3.71	3.91	4.12	4.20	4.07	3.83	3.67	3.03	4.00	3.15	3.29	3.45	3.78
1897 (8 stations)----	3.67	4.32	4.29	4.13	3.79	4.08	3.73	3.02	3.96	2.64	2.97	3.34	3.73
In 1897 Greater than Av. for 20 years, 1877-96.....	.20	.64	.50	.31	.16	.36	.25	-----	.53	-----	-----	.12	.24
In 1897 Less than Av. for 20 years, 1877-96.....	-----	-----	-----	-----	-----	-----	-----	.01	-----	.52	.21	-----	-----
In 1897 Greater than in 1896.....	-----	.41	.17	-----	-----	.25	.06	-----	-----	-----	-----	-----	-----
In 1897 Less than in 1896.....	.04	-----	-----	.07	.28	-----	-----	.01	.04	.51	.32	.11	.05

* In this exhibit allowance has been made for difference in sensitiveness of different lots of test paper.

† Mendon for 1877-83; Niles for 1878-81; Nirvana for 1877-79 and to and including April 25, 1880; Reed City for April 26 to end of year 1880 and for 1881-85; Coldwater, Agr'l College for 1877-78, 1880; Otisville for 1878-80; Washington for 1879-83; Petoskey, Woodmere Cemetery for 1878-79; Fife Lake, Ypsilanti for 1877; Ionia for 1880, 1883-84; Adrian for 1880; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Parkville for 1882; Port Austin for 1883-85, 1888-89; Winfield for 1883; Manistigue, Mackinaw City, Swartz Creek for 1884-85; Pentwater for 1886; Kalamazoo for 1877-88; Alpena for 1879-87; Marquette for 1880-81, 1883-84, 1886-87; Grand Haven for 1880-84; Escanaba for 1881-85, 1887; Port Huron for 1881-85; Otsego for 1890; Marshall for 1881-92; Albion for 1890-91; Tecumseh for 1877-85, 1894-96; Adrian for 1880, 1894-96; Thornville for 1877-96; Lansing for 1879-96; Ann Arbor for 1880-91, 1893-96; Harrisville for 1881-82, 1885-96; Traverse City for 1882-96; Battle Creek for 1877-80, 1882-84, 1892-96; Rockland for 1891-92, 1894-96.

EXHIBIT 31.—Average Amount of Atmospheric Ozone (Night), by Year and Months, in 1897, compared with Annual and Monthly Averages for 1896, and for the 20 Years, 1877-96. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Ozone by Night.—Degrees of Coloration of Test-paper.†												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 20 years, 1877-96	3.66	3.97	4.29	4.27	4.01	3.95	3.67	3.06	3.25	3.01	3.29	3.47	3.88
1896 (9 stations)----	4.16	4.04	4.61	4.64	4.48	4.53	4.40	3.62	4.37	3.54	3.43	3.95	4.29
1897 (8 stations)----	4.10	4.22	4.80	4.73	4.26	4.58	4.23	3.67	4.32	3.04	3.17	3.77	4.41
In 1897 Greater than Av. for 20 years, 1877-96.....	.44	.25	.51	.46	.25	.63	.56	.61	.07	.03	-----	.30	.53
In 1897 Less than Av. for 20 years, 1877-96.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	.12	-----	-----
In 1897 Greater than in 1896.....	-----	.18	.19	.09	-----	.05	-----	.05	-----	-----	-----	-----	.12
In 1897 Less than in 1896.....	.06	-----	-----	-----	.22	-----	.17	-----	.05	.50	.26	.18	-----

* The stations represented in Exhibit 31 are the same as those represented in Exhibit 30, relative to day ozone, and named in foot-note of that exhibit.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test paper.

OBSERVATIONS FOR OZONE AT LANSING.

Since July 1, 1884, the observations for ozone at Lansing have been taken at the new shelter for meteorological instruments in the southwest part of the Capitol yard. Previous to July 1, 1884, the observations had been taken at the office window. Exhibit E, page 60, of the report for 1885, shows that the average for the month for July, 1884, is greater at each observation—7 A. M. to 2 P. M., 2 P. M. to 9 P. M., and 9 P. M. to 7 A. M., at the shelter for instruments than at the office window. Possibly this fact should be taken into consideration in studying ozone at Lansing through a long period of years.

EXHIBIT 32.—Average Velocity of the Wind in Miles per hour, by Year and Months in 1897, compared with Annual and Monthly Averages for 1896, and for the 15 years, 1882-96. From Registers of the Robinson's Self-Registering Anemometer.* These Averages are for groups of several Stations in Michigan.

Years, etc.	Average Miles per Hour.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 15 yrs., 1882-96.	9.7	10.8	10.9	10.8	10.4	9.6	7.8	7.9	7.7	8.8	9.7	10.9	10.9
1896 (7 stations)....	9.8	9.8	11.8	12.0	11.2	10.3	7.4	7.6	8.0	9.2	9.0	12.3	9.1
1897 (8 stations)....	9.4	10.8	10.0	10.9	11.0	9.2	7.9	7.3	7.7	7.5	8.6	11.2	10.1
In 1897 Greater than av. for 15 years, 1882-96.....	-----	0	-----	.1	.6	-----	.1	-----	0	-----	-----	.3	-----
In 1897 Less than av. for 15 years, 1882-96.....	.3	0	.9	-----	-----	.4	-----	.6	0	1.3	1.1	-----	.8
In 1897 Greater than in 1896.....	-----	1.0	-----	-----	-----	-----	.5	-----	-----	-----	-----	-----	1.0
In 1897 Less than in 1896.....	.4	-----	1.8	1.1	.2	1.1	-----	.3	.3	1.7	.4	1.1	-----

* Gibbon's Anemometer was used at Ann Arbor.

EXHIBIT 33.—Average Velocity of the Wind in Miles per Hour, by Months for the 17 Years, 1880-96, and comparisons of 1897 with this Average and with the year 1896. From Registers of the Robinson's Self-Registering Anemometer in the Office of the State Board of Health, State Capitol, Lansing, Michigan.

Years, etc.	Miles, by Self-Registering Anemometer.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 17 yrs., 1880-96.	9.8	11.0	11.6	11.3	11.1	9.7	8.2	7.8	7.2	8.6	9.1	10.9	11.0
1896.....	9.9	9.2	12.5	11.4	12.3	11.3	7.6	7.0	7.8	8.4	8.8	13.7	9.0
1897.....	9.7	11.3	11.9	12.1	11.5	9.2	8.9	7.2	7.4	6.5	8.4	11.7	10.5
In 1897 Greater than av. for 17 years, 1880-96.....	-----	.3	.3	.8	.4	-----	.7	-----	.2	-----	-----	.8	-----
In 1897 Less than av. for 17 years, 1880-96.....	.1	-----	-----	-----	-----	.5	-----	.6	-----	2.1	.7	-----	.5
In 1897 Greater than in 1896.....	-----	2.1	-----	.7	-----	-----	1.3	.2	-----	-----	-----	-----	1.5
In 1897 Less than in 1896.....	.2	-----	.6	-----	.8	2.1	-----	-----	.4	1.9	.4	2.0	-----

TABLE X.—Average Velocity of the Wind in Miles per Hour, for each Hour of the Day, by Months of the Year 1897. Compiled from Registers of the Robinson's Self-Registering Anemometer, exposed above the roof of the Capitol, and registering in the office of the State Board of Health, Lansing, Mich.

Months.	Averages.		Hours (1897) and Average Miles per Hour.												A. M.					
	Av. 18 years, 1880-97.	1897.	A. M.						P. M.											
			7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1
Year.....	9.8	9.9	9.2	9.5	10.1	10.7	11.3	12.1	11.9	11.9	11.4	10.9	9.9	9.6	9.2	9.2	9.1	9.0	8.6	8.8
January.....	11.0	9.2	10.8	12.0	12.1	12.2	12.9	13.6	13.1	13.2	12.3	12.0	10.7	11.1	11.2	11.0	10.9	10.5	10.7	10.3
February.....	11.6	12.5	10.3	10.2	11.4	12.7	13.4	14.2	14.4	14.0	13.1	13.3	12.5	12.3	11.1	11.4	11.3	11.9	11.8	11.7
March.....	11.3	11.4	12.1	11.5	11.7	12.1	13.0	14.0	14.9	15.3	15.3	15.4	14.5	13.3	12.7	12.4	12.2	11.9	10.6	10.1
April.....	11.1	12.3	11.5	11.6	12.1	12.8	13.4	14.0	13.4	13.8	13.0	13.1	12.2	11.4	11.4	11.6	10.9	10.2	9.9	10.7
May.....	9.7	11.3	9.2	9.7	9.6	10.2	10.3	10.7	11.4	12.1	11.8	11.7	10.9	9.9	8.8	8.7	7.8	7.3	7.1	7.3
June.....	8.2	7.6	8.5	8.6	8.9	9.0	10.0	11.6	12.4	12.0	11.4	10.7	8.9	8.3	7.2	7.3	7.2	7.5	7.1	7.3
July.....	7.8	7.0	6.8	7.4	8.4	9.0	9.0	9.3	9.0	9.4	8.9	7.8	7.9	7.1	6.4	6.6	6.7	6.4	5.8	5.9
August.....	7.3	7.8	7.4	7.3	8.1	8.8	9.4	9.9	9.8	10.0	9.8	9.0	7.7	6.8	6.4	7.1	6.7	6.4	6.0	6.1
September.....	8.4	8.4	8.5	5.1	5.3	5.7	6.6	7.4	8.2	7.4	7.2	7.6	7.4	5.8	6.3	6.2	6.8	6.8	7.0	6.9
October.....	9.0	8.8	8.4	7.6	8.5	9.6	9.7	10.0	10.8	10.1	9.6	8.2	7.6	8.2	8.5	8.3	8.5	8.0	7.1	7.8
November.....	11.0	13.7	11.7	10.3	11.4	12.2	12.8	13.1	14.7	14.4	13.0	11.9	10.5	11.3	11.2	10.7	10.7	11.0	10.7	11.5
December.....	11.0	9.0	10.5	10.6	9.8	10.8	12.0	12.3	13.0	12.1	11.8	10.9	10.3	9.9	9.5	9.4	9.8	10.0	9.8	10.0

* For only about 27 days. † For only about 23 days. ‡ For only about 30 days. § For only about 29 days. || For only about 28 days.

The statements in the third figure column in Table X. of the average velocity of the wind in miles per hour, by months, during the year 1897, are graphically represented in Diagram XI. The remaining columns of Table X. for 1897 are graphically represented in Diagram X.

DIAGRAM X.—VELOCITY OF WIND, BY HOURS AND MONTHS, 1897.

AV. MILES PER HOUR, FOR EACH HOUR OF THE DAY, AT STATE CAPITOL, LANSING, MICH.: JAN. ———, FEB. —.x, MAR. —x., APR. —o—o, MAY ———, JUN. —ox—ox, JUL. —.x—x, AUG. —xx—xx, SEPT. —o—o—o, OCT. —x—x, NOV. —.x—x, DEC. ———; AV. FOR 12 MONTHS xxxxxxxx.

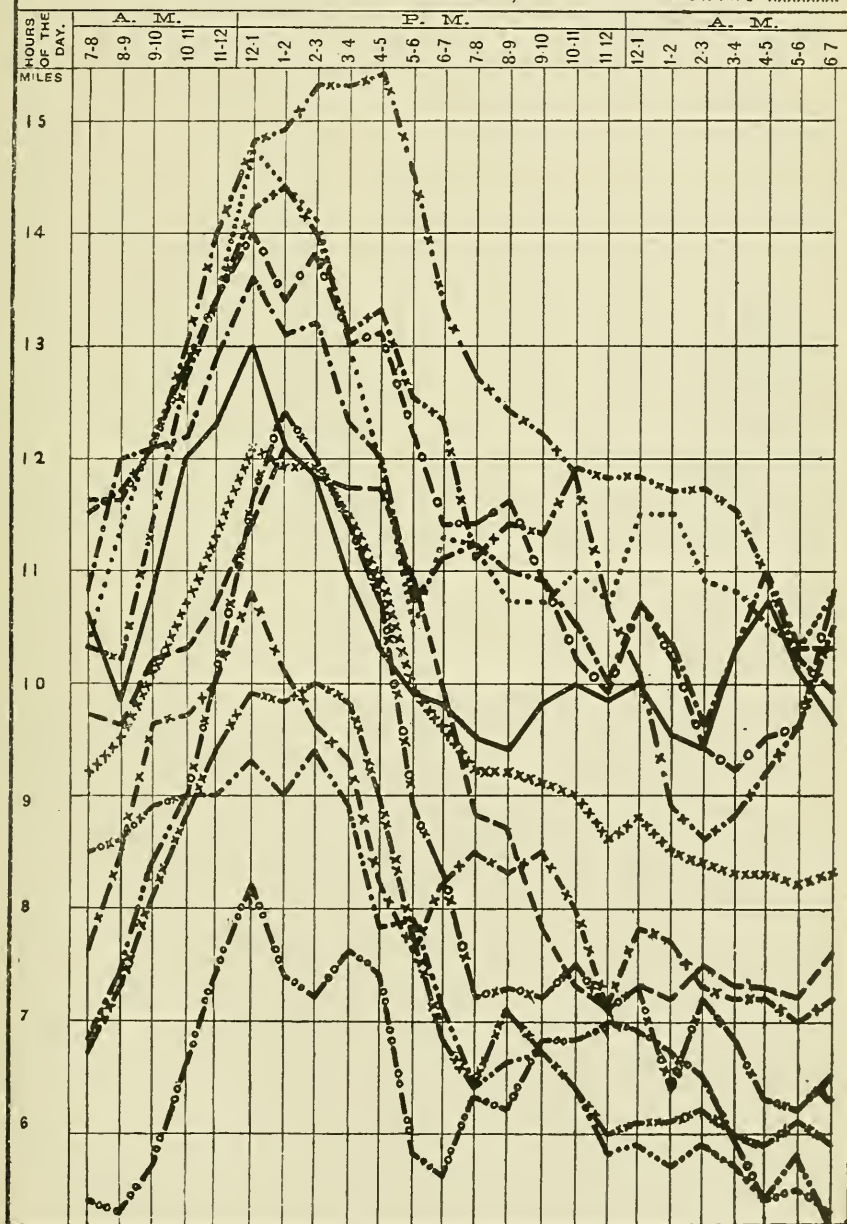


TABLE XI.—Average Velocity of the Wind in Miles per Hour for the Year and for each Month of the Year 1897, at 8 Stations in Michigan. Computed from Registers of the Robinson's Self-Registering Anemometer,* by Observers for the State Board of Health, and for the U. S. Weather Bureau.

Stations in Michigan.†	Divisions of the State.	Miles, by Self-Registering Anemometer.													
		Year.		Months, 1897.											
		Norm. ‡	1897.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 8 sta- tions.....			9.4	10.8	10.0	10.9	11.0	9.2	7.9	7.3	7.7	7.5	8.6	11.2	10.1
Marquette.....	U. P.	¹² 9.6 ₆	9.7	11.3	8.5	9.4	11.5	9.9	7.1	7.5	9.2	10.5	10.0	10.9	10.5
Sault Ste. Marie	U. P.	² 8.6	8.8	9.0	8.9	9.7	9.7	8.8	8.0	7.0	8.1	7.2	8.8	11.7	8.8
Alpena.....	N. E.	⁸ 9.4	9.2	9.8	10.4	10.6	10.1	9.2	7.9	7.7	7.8	7.6	9.2	11.2	9.1
Grand Haven..	W.	¹⁶ 10.6	10.1	12.6	11.0	11.5	12.3	10.3	8.4	7.7	7.9	7.1	8.2	12.4	11.7
Port Huron....	B. & E.	¹⁸ 10.6	10.6	12.2	11.1	12.4	12.0	9.8	8.7	8.2	8.5	9.0	9.7	13.5	11.6
Lansing, S. B. } of H.	C.	² 9.0	9.7	11.3	11.9	12.1	11.5	9.2	8.9	7.2	7.4	6.5	8.4	11.7	10.5
Ann Arbor.....	S. C.	¹⁶ 7.9	7.7	9.1	8.0	10.2	10.4	7.8	6.0	5.8	5.5	4.8	6.1	9.9	9.2
Detroit.....	S. E.	9.9	9.1	11.1	10.4	11.2	10.8	8.7	8.1	7.5	7.5	7.1	8.5	8.3	9.6

* Gibbon's Anemometer was used at Ann Arbor.

† The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit 1.

‡ Numbers in this column state the average velocity of the wind in miles per hour for periods of years ending in each case with December 31, 1897. The small figures above and at the right of numbers which state the average denote the number of years included in the average.

Graphic representations of statements made in Table XI. are given in Diagram XI.

The construction and purport of the diagrams relating to direction of wind may be explained as follows:

In Diagrams XII., XIII., XIV. and XV., relating to the direction of the wind, the single figures or separate groups in lines are designed to indicate by the length of the lines the number and the proportion of regular observations at 7 A. M., 2 P. M. and 9 P. M. daily, at which the wind was blowing from each of the eight principal points of compass at the places and for the periods of time stated in the margin; and by the direction of the lines on the page, the direction of the wind. Each figure consists of lines drawn to a common center from some or all of the following directions on the page and indicating that at the times of observation the wind blew from points of the compass as follows: Lines toward the common center from the top of the page indicate observations that the wind was blowing from the north; from the right-hand side, observations that the wind was from the east; from the bottom of the page, that it was from the south; from the left-hand side, that it was from the west; from the upper left-hand corner, that it was from the northwest; from the upper right-hand corner, that it was from the northeast; from the lower right-hand corner, that it was from the southeast; and from the lower left-hand corner that it was from the southwest. The number of regular observations at which the wind was blowing from the direction denoted by a line as indicated by the length of that line, .01 of an inch being the unit or the length of line for one observation. The circles indicate calms, the number of regular observations at which there was no wind being denoted by the length of the radius of the circle drawn about the point of convergence of the lines for a given place or period of time, the length of one observation being, as before, .01 of an inch. Thus by Diagram XII., or by Table XIV., it appears that at Tecumseh in October, 1897, at 10 of the regular tri-daily observations for the month there was a calm; at 6 observations the wind was blowing from the west; at 22 observations, from the northwest; at 21 from the northeast, etc. For convenient study the top of these diagrams should be held toward the north. Definite numerical statements corresponding to these diagrams are given in Tables XII., XIII., and XIV. and Exhibit 34

DIAGRAM XI- VELOCITY OF WIND, BY MONTHS, 1897.

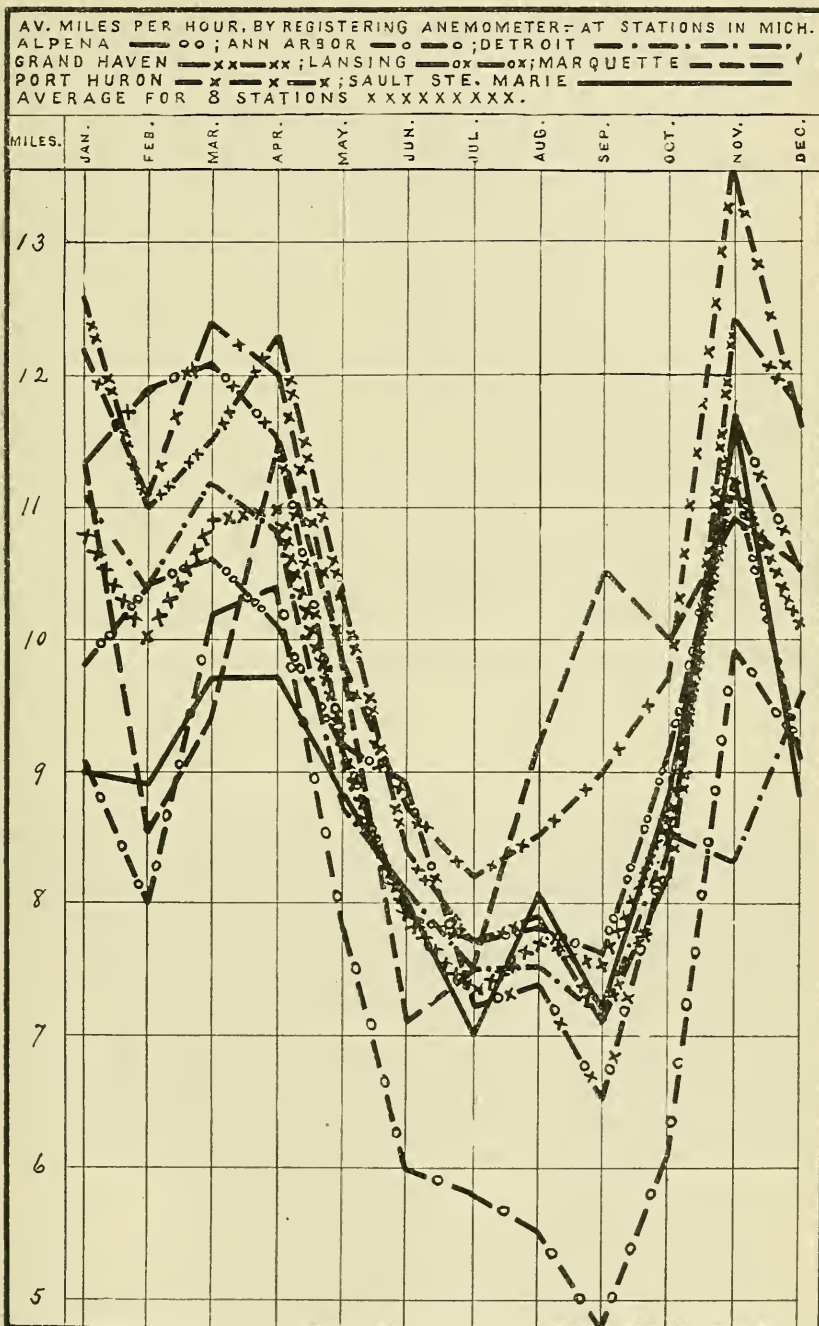


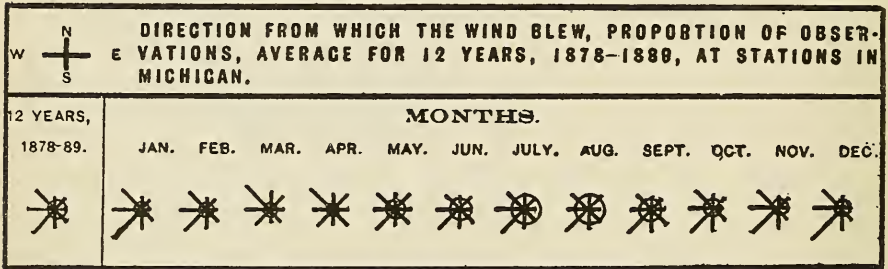
EXHIBIT 34.—DIRECTION OF WIND, 1878-89.—*Number of Observations per month (made tri-daily), at which the wind was blowing from the several (eight) points of Compass.—Annual and Monthly Averages for the 12 years, 1878-89, at Stations in Michigan.**

Points of Compass.	Average Number of Observations per Month—12 Years, 1878-89.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations.....	91	93	85	93	90	93	90	93	93	89	92	90	93
Calm.....	5	4	4	4	4	5	6	8	8	6	5	4	4
North.....	7	6	6	10	9	8	7	8	8	6	8	6	6
Northeast.....	8	6	7	10	11	11	9	8	10	7	8	7	5
East.....	6	5	6	7	8	8	6	5	6	6	5	5	5
Southeast.....	9	9	9	9	11	11	10	8	9	11	9	7	8
South.....	10	11	10	7	8	10	11	10	10	12	12	11	11
Southwest.....	17	22	16	12	12	15	16	18	17	18	18	19	23
West.....	14	16	14	14	11	12	13	16	12	12	13	17	17
Northwest.....	14	15	13	19	16	13	11	13	13	12	14	15	14

* At 12 stations in 1878; 16 in 1879; 19 in 1880; 19 in 1881; 21 in 1882; 19 in 1883; 21 in 1884; 21 in 1885; 16 in 1886; 17 in 1887; 13 in 1888 and 11 in 1889.

Graphic representations of statements made in Exhibit 34 are given in Diagram XIII.

DIAGRAM XIII.—WIND, DIRECTION, IN MICH., AVERAGE 12 YEARS, 1878-1889.



* SCALE, RADIUS .01 OF ONE INCH TO ONE OBSERVATION
[Plate 675.]

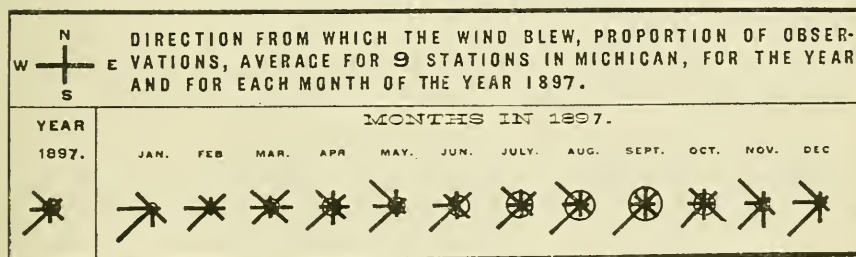
TABLE XII.—*Number of Observations per Month (at 7 A. M., 2 P. M. and 9 P. M., Daily), at which the wind was blowing from each of the Eight Principal Points of Compass, during the Year and during each Month of the Year 1897. Average for 9 Stations in Michigan.**

Points of Compass.	Average Number of Observations per Month, 1897.												
	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All observations (9 stations).....	90	91	83	92	89	90	89	90	92	88	93	89	92
Calm.....	5	3	3	4	4	5	6	8	9	10	7	4	2
North.....	7	1	6	6	9	9	8	8	7	8	8	7	6
Northeast.....	8	1	11	13	9	6	10	11	7	9	9	6	6
East.....	5	5	8	11	7	2	2	6	4	5	6	2	4
Southeast.....	9	11	9	12	9	6	9	9	8	9	16	8	6
South.....	8	11	4	6	10	6	7	6	6	8	9	13	11
Southwest.....	21	27	18	14	20	21	21	19	22	24	18	19	25
West.....	12	19	15	12	8	14	14	8	10	7	9	11	15
Northwest.....	14	12	10	14	12	21	10	15	19	7	11	19	16

* The names of observers, their places of observation, and the counties and divisions of the State in which those places are situated are stated in Exhibit 1.

Graphic representations of statements in Table XII. are given in Diagram XIV.

DIAGRAM XIV.—WIND, DIRECTION, IN MICH., YEAR AND MONTHS, 1897.



[PLATE 987.]

TABLE XIII.—Average Number of Observations per Month for the Year 1897, at which the wind was blowing from each of the Eight Principal Points of the Compass, at each of 9 Stations* in Michigan; also the average line for the 9 Stations.

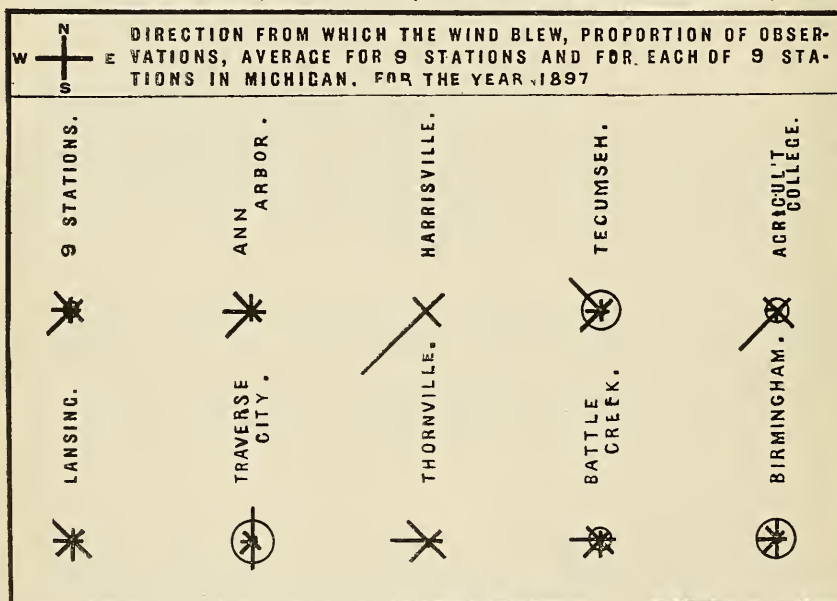
Stations in Michigan.*	Divisions of the State,†	Average Number of Observations per Month, 1897.									
		All Obs.	Calms.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
Av. for 9 Stations.....		90	5	7	8	5	9	8	21	12	14
Traverse City.....	N. W.	88	12	20	4	3	6	16	10	7	8
Harrisville.....	N. E.	91	0	0	14	0	12	0	52	1	11
Thornville.....	B. & E.	91	0	1	9	8	14	4	16	22	17
Agricultural College.....	C.	91	7	2	10	3	13	5	31	8	11
Lansing, S. B. of H.....	C.	91	0	7	8	6	14	12	13	14	18
Ann Arbor.....	S. C.	91	1	9	8	8	8	6	21	17	14
Battle Creek.....	S. C.	91	6	5	6	8	11	11	14	18	11
Tecumseh.....	S. C.	91	11	6	9	5	3	6	17	9	26
Birmingham.....	S. E.	83	11	12	5	6	3	13	12	11	10

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit I.

† The full names of the divisions and counties in each division are stated in Exhibit I, in a paper which follows, on weekly reports of sickness.

Graphic representations of statements in Table XIII. are given in Diagram XV.

DIAGRAM XV.—WIND, DIRECTION, AT STATIONS IN MICHIGAN, 1897.



DIAGRAMS RELATING TO METEOROLOGICAL CONDITIONS.

Most of the diagrams in this paper are to be read by tracing each irregular line across the diagram from left to right, and noting at what point it intersects each of the perpendicular lines having the name of the month at the top. What station is represented by the irregular line may be learned from the head of the diagram. The degree of value denoted by the intersection may be learned by referring to the figures in the left-hand column. Thus in Diagram I., relating to average temperature in 1897, tracing the line “— . —” representing Harrisville, it may be seen that the average temperature at Harrisville was, in January, 21.23° , in March about 28° , in August about 64° , in October about 52° , etc. Definite numerical statements of the average temperature for each month at each station may be found in Table I. and accompanying each diagram is a table giving exact numerical statements for the conditions represented. The average lines given in each table are represented in the corresponding diagram by an \times line, thus $\times \times \times \times$. The lines in the diagrams give more ready general comparisons of stations with each other, or of months, with each other, than is possible from the mere numerical statements. By Diagram II., it appears at a glance that the average daily range of temperature at Lansing in 1897 was, during September, greater than at any other of the ten stations represented in that diagram, and during February was less at Thornville. The marked agreement in the course of lines in Diagram I., representing mean monthly temperature at eight stations, and also that the agreement is closer in September and October than in the other months, appear at once on reference to the diagram. The resemblance between the lines in Diagram I., relating to mean temperature by months in 1897, and those in Diagram III., relating to absolute humidity of the atmosphere for the same periods, is apparent. By Diagram X., it appears that in every month of the year the highest velocity of the wind (on an average for the month) is reached between 12 m. and 3 p. m., and that the lowest velocity occurs in the latter part of the night or in early morning, and that in 1897 at Lansing, the months of most wind were March and November. By reference to Diagram XI., it may be seen that at other stations in Michigan where records of actual miles of wind traveled were kept, November was in 1897 the month of greatest wind. These statements illustrate the reading of the diagrams for any use it may be desired to make of the tables and diagrams. The four diagrams relating to the direction of the wind are constructed on a different principle and the manner of reading them is explained on preceding pages in this article.

Diagrams XII., XIII., XIV. and XV., relating to the direction of the wind, are constructed on a plan different from that of the other diagrams.

A description of the plan of their construction, method of reading, etc., is printed on a preceding page in this article.

DIAGRAM XII.—WIND, DIRECTION, AT STATIONS, BY MONTHS, 1897.

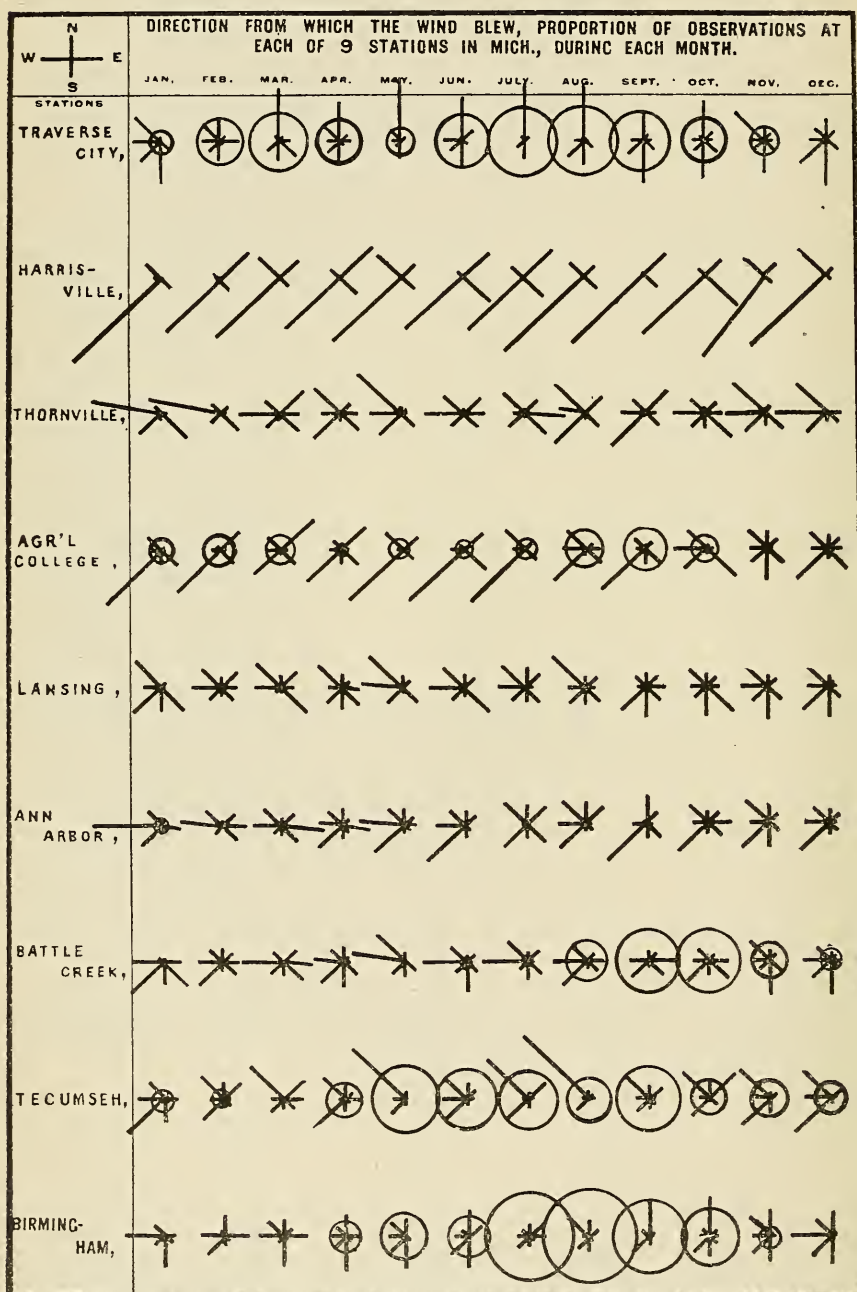


TABLE XIV.—Number of observations for Months and Year 1897, at which the wind was blowing from each of the Eight Principal Points of the Compass, at Nine Stations* in Michigan; also Average Line for Nine of the said Stations from which nearly Complete Observations were received for the Year. (Observations were made at 7 A. M., 2 P. M. and 9 P. M., Daily.)

Stations in Michigan.*	Divi- sions of the State.*	January.										February.										March.									
		Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
Av. 9 stations†.....		91	3	1	1	5	11	11	27	19	12	83	3	6	11	8	9	4	18	15	10	92	4	6	13	11	12	6	14	12	14
Rockland.....	U. P.	92	2	3	3	2	14	7	25	8	28	79	5	9	1	14	14	9	13	10	4	93	3	4	7	16	17	8	12	15	11
Traverse City.....	N. W.	93	7	2	0	0	8	24	16	16	20	84	13	13	4	11	3	11	8	9	12	90	17	30	3	6	9	11	8	2	4
Harrisville.....	N. E.	93	0	0	0	0	9	0	69	3	12	84	0	1	23	0	10	0	43	2	5	93	0	0	15	2	7	0	50	2	17
Thornville.....	B. & E.	93	0	1	0	3	21	4	17	41	6	84	0	0	7	4	14	1	8	42	8	93	0	0	19	11	15	3	11	23	11
Agri'l College.....	C.	93	8	0	2	2	13	7	44	6	11	84	10	0	16	3	11	2	34	5	3	93	8	0	26	5	12	3	21	7	11
Lansing, S. B. / of H.....	C.	93	0	1	4	2	18	14	22	11	21	84	0	6	12	9	10	5	10	17	15	93	0	7	13	8	21	4	5	15	20
Ann Arbor.....	S. C.	93	4	2	0	11	4	3	17	40	12	84	1	3	10	14	12	1	6	24	13	93	0	4	9	24	13	6	7	16	14
Battle Creek.....	S. C.	93	0	2	0	10	19	13	26	18	5	84	0	8	8	9	10	6	19	14	10	93	0	1	10	17	16	8	10	23	8
Tecumseh.....	S. C.	93	6	2	3	8	3	14	28	16	13	84	5	10	14	3	6	4	17	7	18	93	3	3	16	11	9	5	11	8	27
Birmingham.....	S. E.	73	0	2	2	5	6	18	8	23	9	72	2	12	3	15	3	6	14	14	3	88	4	10	6	13	3	18	6	15	13

* For names of observers, etc., see Exhibit 1. For names of divisions, etc., see Exhibit I., in a paper which follows, on weekly reports of sickness.

† This line includes all the nine stations, at which observations were made tri-daily, and from which statements complete, or nearly complete, were received for every month of the year.

NOTE.—Graphic representations of statements for nine lines in this table are given in Diagram XII., which is explained on a preceding page in this article.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1897.—Observations at which the Wind was blowing from Direction named.*

Stations in Michigan.*	Divi- sions of the State.*	April.						May.						June.																		
		Total.	N.	N.E.	E.	S.E.	S.S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.S.W.	W.	N.W.					
Av. 9 stations†.	.....	89	4	9	9	7	9	10	20	8	12		5	9	6	2	6	6	21	14	21	89	6	8	10	2	9	7	21	14	10	
Rockland.....	U. P.	90	6	4	11	8	16	8	10	10	17		6	3	3	10	19	5	18	9	20	89	0	4	21	1	18	1	28	3	13	
Traverse City....	N. W.	88	12	22	5	6	3	14	9	6	11		76	8	35	4	0	2	10	4	5	86	15	24	8	1	3	13	8	11	3	
Harrisville.....	N. E.	90	0	2	26	0	13	0	42	0	7		93	0	0	11	0	10	0	53	0	19	90	0	0	20	0	21	0	44	0	5
Thornville.....	B. & E.	90	0	0	8	10	14	5	21	11	21		93	0	5	4	4	10	0	18	18	34	90	0	2	13	12	12	1	12	23	15
Agri' College....	C.	90	4	4	19	0	13	9	27	7	7		87	6	1	12	0	9	1	42	3	13	90	5	0	14	0	17	0	43	8	3
Lansing, S. B. } of H.	C.	90	0	8	6	10	14	13	12	8	19		93	0	7	6	1	12	4	13	24	26	90	0	8	8	0	19	6	11	21	17
Ann Arbor.....	S. C.	90	1	10	5	16	5	8	19	14	12		93	0	9	7	7	4	5	23	26	12	90	0	8	8	1	4	8	31	17	13
Battle Creek....	S. C.	90	0	10	4	4	11	15	18	18	10		93	2	6	2	2	8	9	10	31	23	90	4	5	7	3	8	17	8	25	13
Tecumseh.....	S. C.	90	10	9	6	9	2	7	25	4	18		93	18	5	2	2	0	4	12	8	42	90	16	10	7	4	1	4	16	15	17
Birmingham....	S. E.	81	9	12	2	9	4	20	10	8	7		85	13	10	2	2	3	19	13	11	12	85	12	15	9	1	0	18	15	9	6

*† For these references see foot-notes at bottom of first page of this table.

NOTE.—Graphic representations of statements for 9 lines in this table are given in Diagram XII., which is explained on a preceding page in this article.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1897.—Observations at which the Wind was blowing from Direction named.*

Stations in Michigan.*	Divi- sions of the State.*	July.						August.						September.																	
		Total.	Calm.	N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.	Total.	Calm.	N.	N. E.	E.	S. E.	S. S. W.	W.	N. W.			
Av. 9 Stations +.		90	8	8	11	6	9	6	19	8	15	92	9	7	7	4	8	6	22	10	19	88	10	8	9	5	9	8	24	7	7
Rockland.....	U. P.	92	3	2	9	7	25	9	26	6	5	94	0	0	5	1	22	5	33	0	25	75	1	1	8	2	29	6	22	3	3
Traverse City....	N. W.	77	19	32	3	2	1	10	6	1	3	93	19	31	2	1	6	13	13	6	2	90	17	15	4	4	7	24	11	7	1
Harrisville.....	N. E.	93	0	0	21	0	16	0	45	1	10	93	0	0	9	0	11	0	62	0	11	90	0	0	18	1	11	0	56	1	3
Thornville.....	B. & E.	93	0	3	10	23	16	2	14	8	17	93	0	0	13	2	12	3	21	15	24	90	0	0	19	7	11	2	27	14	10
Agri'l College.....	C.	93	6	2	5	2	9	1	44	8	16	93	11	0	5	8	13	4	25	12	15	90	13	2	5	0	12	9	34	6	9
Lansing, S. B. { of H.....	C.	93	0	11	11	5	11	9	11	16	19	93	0	6	9	6	13	11	13	10	25	90	0	8	8	11	12	18	19	6	8
Ann Arbor.....	S. C.	93	1	11	15	2	15	8	19	3	19	93	0	12	13	3	5	4	21	16	19	90	0	17	8	3	11	8	31	9	3
Battle Creek.....	S. C.	93	4	6	9	4	11	11	7	25	16	93	11	1	6	10	9	4	20	20	12	90	19	6	7	15	12	4	14	11	2
Teemuseh.....	S. C.	93	16	4	14	3	1	5	15	3	32	93	13	4	4	4	1	2	10	4	51	90	18	8	10	5	5	6	10	8	20
Birmingham.....	S. E.	86	24	7	11	9	3	6	12	8	6	85	26	9	6	2	4	9	10	3	16	75	21	20	4	2	1	5	14	2	6

*† For these references see foot notes at bottom of first page of this table.

NOTE.—Graphic representations of statements for 9 lines in this table are given in Diagram XII., which is explained on a preceding page in this article.

TABLE XIV.—CONCLUDED.—*Direction of Wind, Months in 1897.—Observations at which the Wind was blowing from Directions named.*

Stations in Michigan.*	Divi- sions of the State.*	October.										November.										December.										
		Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Total.	Calm.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	
Av. 9 Stations†.		93	7	8	9	6	16	9	18	9	11	89	4	7	6	2	8	13	19	11	19	92	2	6	6	4	6	8	25	15	16	
Rockland.....	U. P.	71	2	1	2	5	25	8	20	0	8	88	1	2	0	1	26	8	28	3	19											
Traverse City....	N. W.	93	12	22	6	4	10	21	8	6	4	89	8	7	5	4	7	18	8	9	23	93	2	12	7	0	8	26	20	9	9	
Hardsville.....	N. E.	93	0	0	14	0	25	0	48	0	6	90	0	0	9	0	5	0	58	2	16	93	0	0	6	0	3	1	59	3	21	
Thornville.....	B. & E.	93	1	3	9	9	21	9	11	19	11	90	0	0	4	0	13	8	17	23	25	93	1	0	0	8	6	16	30	24		
Agri'l College....	C.	93	8	2	3	5	24	3	16	18	14	89	3	10	8	2	12	18	12	10	14	93	3	7	9	8	13	5	25	10	13	
Lansing, S. B. { of H.....	C.	93	0	7	8	8	22	17	9	9	13	90	0	7	7	1	11	19	12	15	18	93	0	6	4	5	10	18	20	13	17	
Ann Arbor.....	S. C.	93	1	7	10	14	10	6	23	8	14	90	0	12	7	1	7	13	21	11	18	93	1	7	8	4	7	31	15	13		
Battle Creek....	S. C.	93	18	0	5	11	16	8	17	9	9	87	10	7	6	2	9	20	8	9	16	89	5	5	4	6	6	20	15	17	11	
Tecumseh.....	S. C.	93	10	10	21	0	7	3	14	6	22	90	11	4	5	3	2	9	23	9	24	93	9	1	9	3	1	3	28	16	23	
Birmingham.....	S. E.	92	16	22	6	6	6	12	13	6	5	85	6	15	3	3	2	14	14	11	17	90	1	15	3	2	1	16	14	21	14	

*† For these references see foot-notes at bottom of first page of this table.

NOTE.—Diagram XII. exhibits lines showing, by months, directions of wind at each of 9 stations in this table; for each month and station the diagram represents the figures given in this table for the same month and stations; it is explained on a preceding page in this article.

TABLE XV.—Average Daily Range of Atmospheric Pressure (as determined from three daily observations) for Months and Year 1897, at 10 Stations, also average line for 10 Stations* in Michigan—Stations arranged in order by Latitude, those farthest North first.

Stations in Michigan.*	Average Daily Range of Barometer—Year and Months, 1897.														
	Norm. †	1896.	1897.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 10 Stations†		.206	.212	.247	.234	.366	.241	.183	.131	.094	.128	.152	.215	.281	.267
Rockland				d	f	e			b	c	b	g	h	b	a
Traverse City	.214 ¹⁶	.209	.204	.260	.225	.346	.240	.153	.123	.092	.126	.171	.209	.243	.263
Harrisville	.215 ³	.211	.216	.245	.244	.390	.229	.222	.131	.084	.130	.165	.220	.262	.267
Thornville	.214 ¹⁴	.211	.213	.265	.214	.388	.222	.184	.127	.090	.132	.141	.200	.287	.208
Agricultural College.	.199 ¹⁵	.208	.199	.221	.227	.385	.227	.170	.115	.085	.122	.121	.205	.267	.237
Lansing, S. B. of H.	.205 ¹⁶	.202	.206	.240	.223	.368	.238	.185	.127	.089	.121	.134	.204	.283	.257
Birmingham	.211 ¹¹	.219	.221	.269	.259	.389	.231	.207	.132	.101	.140	.152	.206	.286	.283
Battle Creek			.211	.248	.222	.340	.230	.184	.132	.095	.121	.143	.213	.344	.254
Ann Arbor	.206 ¹⁶	.207	.213	.232	.235	.393	.228	.184	.132	.096	.124	.136	.205	.321	.268
Tecumseh	.194 ⁶	.188	.193	.240	.233	.339	.226	.159	.115	.079	.112	.114	.188	.277	.235
Adrian		.199	*	.230	.238	.352	.295	.180	.124						

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1. The average atmospheric pressure at each of these stations, by months, in 1897, is given in Table XVII.

† Numbers in this column state the average daily range of atmospheric pressure for periods of years ending in each case with Dec. 31, 1897. The small figures above and at the right of numbers which state the average daily range denote the number of years included in the average.

‡ Not including Adrian.

§ The average for 6 months is .237.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days. h For 20 days.

NOTE.—The latitude and elevations of some of the stations in Table XV. are stated in Exhibit 2.

The daily range is found by subtracting the lowest observation from the highest observation, † A. M. to ‡ A. M.

TABLE XVI.—*Range of Atmospheric Pressure (as determined from three daily observations) for the Year and for each Month and for the Average Month of the Year 1897, at 10 and at each of the 10 Stations, and Average Line for 10 Stations in Michigan; also the Norm.—Average Monthly range for a series of years. Stations named in order by Latitude, those farthest North first.*

Stations in Michigan.	Range of Barometer.—Year and Months, 1897.															
	Norm. +	1896.	1897.	Av. Month.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
For 10 stations†.	-----	-----	2.110	1.683	2.087	1.810	2.055	2.002	1.626	1.303	1.344	1.332	1.290	1.866	1.700	1.775
Av. for 10 stations‡	-----	-----	1.498	.934	1.323	1.024	1.394	1.109	.798	.521	.491	.670	.668	1.039	1.099	1.070
Rockland.....	-----	-----	1.536	1.034	c	f	d	1.328	1.234	.905	b	b	b	g	h	b
Traverse City... .958 ¹⁶	1.245	1.486	.962	1.404	1.021	1.463	c	e	f	.697	f	f	.960	b	d	1.048
Harrisville..... .941 ³	1.304	1.405	.953	1.405	1.055	1.372	1.083	.844	.537	.482	.694	.750	1.040	1.090	1.086	
Thornville..... .947 ¹⁴	1.363	1.525	.957	1.385	1.028	1.411	1.084	.846	.504	.446	.703	.656	1.072	1.090	1.263	
Agr'l College... .888 ¹⁵	1.430	1.459	.903	1.302	1.223	1.408	1.088	.747	.475	.452	.634	.600	.976	.988	.948	
Lansing, S. B. of H. .908 ¹⁶	1.417	1.481	.914	1.343	.966	1.418	1.109	.815	.503	.473	.644	.642	1.013	1.081	.960	
Birmingham..... .926 ¹¹	1.355	1.686	.962	b	1.607	.994	1.384	c	b	.523	d	a	e	c	b	a
Battle Creek.....	-----	-----	1.512	.892	1.053	.899	1.343	1.063	.730	.483	.390	.617	.576	1.087	1.281	1.230
Ann Arbor..... .909 ¹⁶	1.297	1.489	.900	1.277	.977	1.444	1.058	.731	.522	.443	.654	.653	.977	1.113	.944	
Tecumseh..... .875 ⁶	1.368	1.400	.859	1.288	.935	1.364	1.089	.758	.417	.423	.617	.539	.947	1.093	.839	
Adrian.....	-----	-----	1.307	§	1.291	.973	1.354	1.070	.761	.417	-----	-----	-----	-----	-----	-----

† Numbers in this column state the average monthly range of atmospheric pressure for a period of years ending in each case with December 31, 1897. The small figures above and at the right of the numbers which state the average denote the number of years included in the average.

‡ Represents the difference between the highest of 10 stations and the lowest of 10 stations for year and for each month of year, not including Adrian.

¶ Represents sum of ranges at 10 stations divided by 10.

§ The average for 6 months is .978.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e for 26 days. f For 25 days. g For 24 days. h For 23 days.

NOTE.—The statements in the star (*) foot-note to Table XV. apply also to Table XVI.

EXHIBIT 35.—Average Atmospheric Pressure, by Year and Months, in 1897, Compared with Annual and Monthly Averages for 1896, and for the 20 years, 1877-96. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Average Atmospheric Pressure.—Inches of Mercury.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 20 years, 1877-96.	29.137	29.155	29.154	29.133	29.122	29.095	29.097	29.116	29.137	29.172	29.154	29.151	29.152
1896 (9 stations)....	29.137	29.208	28.979	29.149	29.161	29.078	29.105	29.134	29.152	29.129	29.153	29.175	29.214
1897 (10 stations)....	29.073	29.076	29.069	29.063	29.100	29.035	29.022	29.000	29.047	29.215	29.127	29.073	29.045
In 1897 Greater than Av. for 20 years, 1877-96.....										.043			
In 1897 Less than Av. for 20 years, 1877-96.....	.064	.079	.085	.070	.022	.060	.075	.116	.090		.027	.078	.107
In 1897 Greater than in 1896.....			.090							.086			
In 1897 Less than in 1896.....	.064	.132		.086	.061	.043	.083	.134	.105		.026	.102	.169

* Woodmere Cemetery (near Detroit) for 1877-79; Mendon for 1877-78, 1881-83; Benton Harbor for 1877-78; Ypsilanti for 1877, 1879; Otisville for 1878-80, 1882; Washington for 1879-80, 1882-83; Nirvana for 1879 and in 1880 to April 25 inclusive; Reed City for 1880 after April 25 and 1881-85; Hastings for 1882; Hillsdale for 1882-83; Manistique for 1884-85; Mackinaw City for 1884-87; Ionia for 1884-85; Swartz Creek for 1885; Port Austin for 1883-84, 1888-89; Marquette for 1879-81, 1886-87; Escanaba for 1880, 1882-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1878-87; Kalamazoo for 1877-82, 1885-89; Alma for 1880, Battle Creek for 1877-80, 1882, 1888-89, 1891-94; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Albion for 1890-91; Rockland for 1891-92, 1894; Adrian for 1894-96; Tecumseh for 1879-80, 1882-85, 1890, 1892-96; Birmingham for 1887-96; Lansing for 1879-96; Agri College for 1881-96; Thornville for 1880-81, 1884-96; Ann Arbor for 1881-96; Traverse City for 1882-96; Harrisville for 1882, 1885-92, 1895-96.

EXHIBIT 36.—Comparisons of the Average Atmospheric Pressure during the Year and during each Month of the Year 1897, with Averages for the 22 Years, 1875-96, and for the Year 1896. Corrected for Temperature and for Instrumental Error. Observations made at 7 A. M., 2 P. M. and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College near Lansing, Michigan.

Years, etc.	Average Atmospheric Pressure.—Inches of Mercury.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 22 years, 1875-96.	29.065	29.069	29.062	29.038	29.044	29.032	29.046	29.068	29.083	29.113	29.076	29.079	29.072
1896.....	29.047	29.104	28.903	29.039	29.054	29.022	29.047	29.057	29.074	29.051	29.077	29.099	29.034
1897.....	29.104	29.111	29.077	29.072	29.130	29.076	29.037	29.004	29.053	29.254	29.214	29.141	29.082
In 1897 Greater than Av. for 22 years, 1875-96.....	.039	.042	.015	.034	.086	.044				.141	.138	.062	.010
In 1897 Less than Av. for 22 years, 1875-96.....							.009	.064	.030				
In 1897 Greater than in 1896.....	.057	.007	.174	.033	.076	.054				.203	.137	.042	.048
In 1897 Less than in 1896.....							.010	.053	.021				

TABLE XVII.—Average Atmospheric Pressure for Months and Year 1897, at each of 10 Stations in Michigan; also Averages for the 10 Stations; as indicated by the height in inches of Mercury in the Barometer. Corrected for Temperature.—Reduced to 32° F. (For some stations not corrected for instrumental error^{g,h}).—Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M. by observers[†] for the State Board of Health.

Stations in Michigan. [†]	Divisions of the State. [‡]	Years.		Months, 1897.											
		Norm.	1897.												
				Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. for 10 Stations [*]			29.073	29.076	29.069	29.063	29.100	29.035	29.022	29.000	29.047	29.215	29.127	29.073	29.045
Rockland	U. P.		28.676	28.650	28.657	28.669	28.729	28.661	28.624	28.636	28.668	28.800	28.652	28.686	28.638 ^a
Traverse City	N. W.	¹⁰	29.324	29.316	29.339	29.340	29.353	29.296	29.254	29.247	29.254	29.288	29.249	29.313	29.273
Harrisville	N. E.	³	29.331	29.328	29.350	29.330	29.378	29.298	29.285	29.261	29.283	29.461	29.368	29.300	29.296
Thornville	B. & E.	¹⁸	28.954	28.979	28.977	28.974	28.969	29.006	28.927	28.935	28.903	28.949	29.137	29.043	28.952
Agricultural College	C.	¹⁶	29.078	29.111	29.077	29.072	29.130	29.076	29.087	29.004	29.053	29.254	29.214	29.141	29.062
Lansing, S. B. of H.	C.	¹⁹	29.062	29.081	29.064	29.067	29.101	29.035	29.031	29.009	29.069	29.235	29.142	29.080	29.072
Adrian	S. C.			^{**}	29.173	29.182	29.125	29.158	29.097	29.101					
Ann Arbor	S. C.	¹⁷	29.033	29.049	29.069	29.026	29.024	29.060	29.002	28.965	28.970	29.017	29.194	29.041	29.080
Battle Creek	S. C.			28.944	28.957	28.953	28.942	29.063	28.913	28.911	28.884	28.918	29.085	28.937	28.866
Tecumseh	S. C.	⁶	29.140	29.151	29.172	29.144	29.132	29.158	29.102	29.083	29.076	29.126	29.303	29.156	29.137
Birmingham	S. E.	¹¹	29.110	29.096	29.110	29.101	29.078	29.118	29.038	29.057	29.069	29.082	29.249	29.152	29.057 ^a

^{*} A correction has been made for instrumental error of barometer at Agricultural College; .013 has been subtracted from each monthly average during the year 1897. At Ann Arbor .004 has been added to each monthly average. For other stations the instrumental error of barometer is not known.

[†] The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit I.

[‡] The full names of divisions and the counties in each division are stated in Exhibit I, in a paper which follows, on weekly reports of sickness.

Numbers in this column state the average annual atmospheric pressure for periods of years ending in each case with December 31, 1897. The small figures at the right of the numbers which state the average denote the number of years included in the average.

This line is an average for 10 stations, at which observations were made tri-daily, and from which reports, nearly complete, were received for every month in the year. It does not include Adrian. Green's standard barometer was used at all the 11 stations for 1897.

^a The average for 6 months is 29.138.

^b Computations made monthly averages for the year 1897 were furnished by the observer at Ann Arbor. The remainder of the computations were made at the office of the State Board of Health.

^c For 27 days. ^d For 25 days. ^e For 26 days. ^f For 25 days. ^g For 24 days. ^h For 22 days.

ⁱ For 30 days. ^j For 29 days. ^k For 28 days.

The lines for 10 stations in this table are graphically represented in Diagram XVI.

DIAGRAM XVI—ATMOSPHERIC PRESSURE, BY MONTHS, 1897.

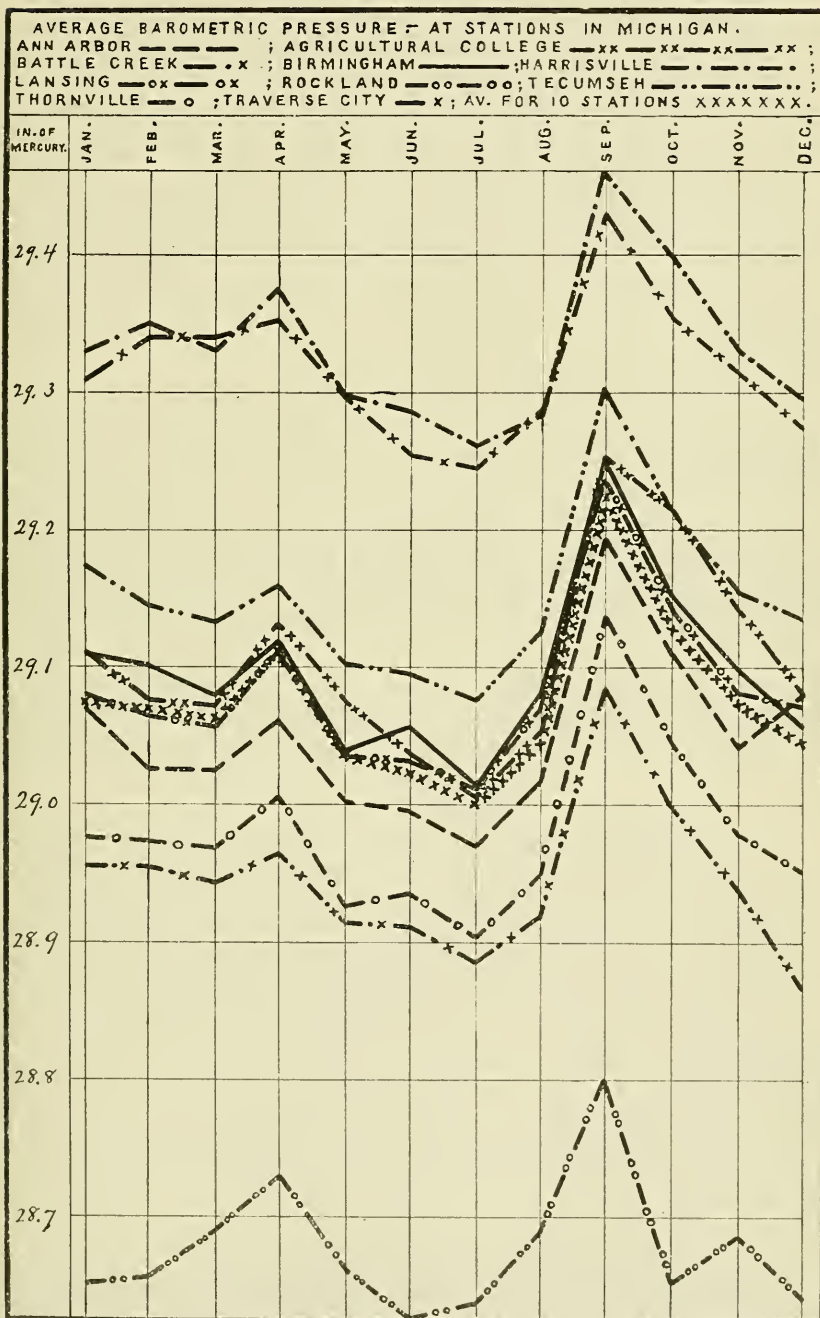


EXHIBIT 37.—Average Daily Range of Atmospheric Pressure, by Year and Months, in 1897, compared with Annual and Monthly Averages for 1896, and for the 15 Years, 1882-96. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Average Daily Range of Barometer.—Year and Months, 1897.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 15 years, 1882-96	.210	.300	.306	.258	.215	.167	.135	.128	.132	.169	.207	.249	.266
1896 (9 stations)....	.206	.226	.307	.286	.176	.186	.135	.148	.156	.232	.131	.254	.235
1897 (10 stations)....	.212	.247	.234	.366	.241	.183	.131	.094	.128	.152	.215	.281	.267
In 1897 Greater than Av. for 15 years, 1882-1896.....	.002	-----	-----	.108	.026	.016	-----	-----	-----	-----	.008	.032	.001
In 1897 Less than Av. for 15 years, 1882-96.....	-----	.063	.072	-----	-----	-----	.004	.034	.004	.017	-----	-----	-----
In 1897 Greater than in 1896.....	.003	.021	-----	.080	.065	-----	-----	-----	-----	-----	.084	.027	.032
In 1897 Less than in 1896.....	-----	-----	.073	-----	-----	.003	.004	.054	.028	.080	-----	-----	-----

* Port Austin for 1883-84, 1888-89; Kalamazoo for 1886-89; Mackinaw City for 1884-87; Reed City for 1882-85; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Swartz Creek for 1885; Marquette for 1882-84, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit for 1883-87; Alma for 1890; Albion for 1890-91; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Battle Creek for 1888-89, 1892-94; Traverse City, Lansing, Ann Arbor for 1882-96; Agricultural College for 1883-96; Thornville for 1884-96; Harrisville for 1885-92, 1895-96; Birmingham for 1887-96; Tecumseh for 1882-85, 1890, 1892-96; Adrian for 1894-96.

EXHIBIT 38.—Range of Atmospheric Pressure, by Year and Months, in 1897, compared with Annual and Monthly Averages for 1896, and for the 15 Years, 1882-96. These Averages are for Groups of Several Stations in Michigan.*

Years, etc.	Range of Barometer.—Year and Months, 1897.												
	Annual Av.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 15 years, 1882-96	.956	1.269	1.324	1.123	1.039	.804	.700	.589	.610	.803	1.003	1.102	1.129
1896 (9 stations)----	.884	1.051	1.169	1.075	.901	.804	.617	.499	.734	.956	.815	1.012	.981
1897 (10 stations)----	.934	1.323	1.024	1.394	1.109	.798	.521	.491	.670	.668	1.039	1.099	1.070
In 1897 Greater than Av. for 15 years, 1882-96-----		.054		.271	.070				.060		.036		
In 1897 Less than Av. for 15 years, 1882-96-----	.022		.300			.006	.179	.098		.135		.003	.059
In 1897 Greater than in 1896-----	.050	.272		.319	.208						.224	.087	.089
In 1897 Less than in 1896-----			.145			.006	.096	.008	.064	.288			

* Reed City for 1882-85; Port Austin for 1883-84, 1888-89; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Mackinaw City for 1884-87; Swartz Creek for 1885; Marquette for 1882-1884, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit for 1883-87; Kalamazoo for 1888-89; Battle Creek for 1888-89, 1891-94; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Albion for 1890-91; Rockland for 1892; Tecumseh for 1882-85, 1892-96; Traverse City, Lansing, Ann Arbor for 1882-96; Agricultural College for 1883-96; Thornville for 1884-96; Harrisville for 1885-92, 1895-96; Birmingham for 1887-96; Adrian for 1894-96.

SUNSHINE AND CLOUDS.

On the back of each blank register supplied by this Board to observers, on which they are to register meteorological data, is a statement that "One observer has reported a record of days 'all or nearly all cloudy' and days 'all or nearly all sunshine.' The State Board of Health would be glad to have such a report from all observers who can conveniently make it. Memoranda may be made in a column headed 'cloudy or sunny,' days more than 80 per cent of clouds being marked with the abbreviation 'C,' indicating *cloudy*, and days with less than 20 per cent of clouds with an 'S,' indicating *sunshine*."

The following are statements of the days in each month which were reported "Sunny," "Clear," "Fair," "Partly cloudy," and "Cloudy," by observers at stations in Michigan, except Thornville, concerning which notes are given explaining the method of statement.

ROCKLAND.

JANUARY.—Sunny, 8, 13, 25, 30—4 days. Cloudy, 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 31—27 days.

FEBRUARY.—Sunny, 14, 18, 21, 25, 26, 27, 28—7 days. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 17, 19, 20, 22, 23, 24—20 days.

MARCH.—Sunny, 1, 2, 3, 6, 10, 12, 15, 16, 18, 24, 25, 26, 27, 28, 29, 30, 31—17 days. Cloudy, 4, 5, 7, 8, 9, 11, 13, 14, 17, 19, 20, 21, 22, 23—14 days.

APRIL.—Sunny, 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 14, 16, 17, 19, 20, 22, 24, 25, 26, 27—20 days. Cloudy, 4, 12, 13, 15, 18, 21, 23, 28, 29, 30—10 days.

MAY.—Sunny, 1, 3, 4, 6, 7, 8, 9, 10, 12, 14, 15, 16, 17, 21, 24, 25, 28—17 days. Cloudy, 2, 5, 11, 13, 18, 19, 20, 22, 23, 26, 27, 29, 30, 31—14 days.

JUNE.—Sunny, 1, 6, 7, 8, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 29, 30—19 days. Cloudy, 2, 3, 4, 5, 9, 10, 16, 17, 25, 27, 28—11 days.

JULY.—Sunny, 1, 2, 3, 4, 5, 6, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 24, 27, 28, 29, 30, 31—24 days. Cloudy, 7, 9, 10, 22, 23, 25, 26—7 days.

AUGUST.—Sunny, 1, 3, 4, 5, 6, 7, 8, 11, 12, 13, 16, 17, 19, 20, 22, 25, 27, 28, 29, 30, 31—21 days. Cloudy, 2, 9, 10, 14, 15, 18, 21, 23, 24, 26—10 days.

SEPTEMBER.—Sunny, 1, 2, 3, 4, 7, 8, 9, 11, 12, 13, 14, 17, 20, 21, 22, 23, 24—17 days. Cloudy, 5, 6, 10, 15, 16, 18, 19, 25—8 days. No record for rest of month.

OCTOBER.—Sunny, 7, 9, 14, 16, 17, 23, 24, 25, 26, 27—10 days. Cloudy, 3, 4, 5, 6, 8, 10, 11, 12, 13, 15, 18, 19, 20, 21, 22—15 days. No record for rest of month.

NOVEMBER.—Sunny, 1, 2, 3, 7, 8, 13, 17, 20, 23, 27—10 days. Partly cloudy, 6, 19. Cloudy, 4, 5, 9, 10, 11, 12, 14, 15, 16, 18, 21, 22, 24, 25, 26, 28, 29, 30—18 days.

DECEMBER.—Sunny, 2, 3, 4, 19, 20, 21—6 days. Cloudy, 1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31—25 days.

MARQUETTE.

JANUARY.—Clear, 13, 19, 23, 25, 30—5 days. Partly cloudy, 8, 18, 24, 26—4 days. Cloudy, 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16, 17, 20, 21, 22, 27, 28, 29, 31—22 days.

FEBRUARY.—Clear, 26, 27, 28. Partly cloudy, 16, 19. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 24, 25—23 days.

MARCH.—Clear, 10, 15, 16. Partly cloudy, 2, 4, 11, 18, 25, 27, 28, 30, 31—9 days. Cloudy, 1, 3, 5, 6, 7, 8, 9, 12, 13, 14, 17, 19, 20, 21, 22, 23, 24, 26, 29—19 days.

APRIL.—Clear, 1, 6, 10, 14, 20, 27—6 days. Partly cloudy, 2, 3, 8, 9, 11, 12, 18, 19, 21, 22, 26—11 days. Cloudy, 4, 5, 7, 13, 15, 16, 17, 23, 24, 25, 28, 29, 30—13 days.

MAY.—Clear, 4, 8, 10, 16, 21, 28—6 days. Partly cloudy, 3, 5, 6, 7, 9, 11, 12, 14, 15, 17, 24, 25, 26—13 days. Cloudy, 1, 2, 13, 18, 19, 20, 22, 23, 27, 29, 30, 31—12 days.

JUNE.—Clear, 6, 8, 11, 13, 25—5 days. Partly cloudy, 1, 7, 9, 14, 15, 18, 20, 21, 24, 26, 27, 30—12 days. Cloudy, 2, 3, 4, 5, 10, 12, 16, 17, 19, 22, 23, 28, 29—13 days.

JULY.—Clear, 11, 13, 17, 18, 19, 20, 28, 30—8 days. Partly cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 12, 16, 21, 24, 27, 31—14 days. Cloudy, 9, 10, 14, 15, 22, 23, 25, 26, 29—9 days.

AUGUST.—Clear, 1, 4, 5, 6, 11, 12, 16, 19, 27, 30, 31—11 days. Partly cloudy, 2, 17, 18, 20, 22, 23, 25, 28, 29—9 days. Cloudy, 3, 7, 8, 9, 10, 13, 14, 15, 21, 24, 26—11 days.

SEPTEMBER.—Clear, 2, 4, 8, 9, 11, 17, 20, 22, 23, 24, 25, 26, 27, 29, 30—15 days. Partly cloudy, 1, 3, 7, 12, 13, 14, 16, 18, 21, 28—10 days. Cloudy, 5, 6, 10, 15, 19—5 days.

OCTOBER.—Clear, 2, 9, 17, 24, 25—5 days. Partly cloudy, 1, 3, 11, 12, 13, 14, 16, 23, 26—9 days. Cloudy, 4, 5, 6, 7, 8, 10, 15, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31—17 days.

NOVEMBER.—Clear, 13, 23. Partly cloudy, 2, 3, 6, 9, 16, 17, 21, 22, 27, 28, 29—11 days. Cloudy, 1, 4, 5, 7, 8, 10, 11, 12, 14, 15, 18, 19, 20, 24, 25, 26, 30—17 days.

DECEMBER.—Partly cloudy, 2, 3, 4, 16, 17, 18, 19, 20, 25, 28—10 days. Cloudy, 1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 21, 22, 23, 24, 26, 27, 29, 30, 31—21 days.

SAULT STE. MARIE.

JANUARY.—Clear, 12, 24, 29. Partly cloudy, 11, 13, 18, 19, 30—5 days. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 16, 17, 20, 21, 22, 23, 25, 26, 27, 28, 31—23 days.

FEBRUARY.—Clear, 3, 4, 10, 18, 25, 26, 28—7 days. Partly cloudy, 8, 9, 11, 15, 16, 19, 21, 23, 27—9 days. Cloudy, 1, 2, 5, 6, 7, 12, 13, 14, 17, 20, 22, 24—12 days.

MARCH.—Clear, 6, 13, 15, 16, 25, 27, 30, 31—8 days. Partly cloudy, 4, 7, 11, 17, 23, 24, 26, 28—8 days. Cloudy, 1, 2, 3, 5, 8, 9, 10, 12, 14, 18, 19, 20, 21, 22, 29—15 days.

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APRIL.—Clear, 1, 3, 6, 7, 9, 11, 14, 20—8 days. Partly cloudy, 2, 8, 10, 12, 15, 17, 19, 22, 23, 25, 26, 27, 28—13 days. Cloudy, 4, 5, 13, 16, 18, 21, 24, 29, 30—9 days.
 MAY.—Clear, 4, 6, 7, 8, 16, 17, 18, 21, 24, 25, 29—11 days. Partly cloudy, 5, 9, 10, 11, 15, 22, 26—7 days. Cloudy, 1, 2, 3, 12, 13, 14, 19, 20, 23, 27, 28, 30, 31—13 days.
 JUNE.—Clear, 1, 5, 6, 8, 9, 10, 13, 15, 19, 20, 23, 24, 25, 26—14 days. Partly cloudy, 7, 11, 12, 14, 16, 18, 21, 22, 27, 30—10 days. Cloudy, 2, 3, 4, 17, 28, 29—6 days.
 JULY.—Clear, 5, 6, 7, 8, 13, 16, 17, 18, 19, 20, 24, 29, 30, 31—14 days. Partly cloudy, 1, 2, 3, 4, 9, 11, 14, 15, 21, 22, 25, 27, 28—13 days. Cloudy, 10, 12, 23, 26—4 days.
 AUGUST.—Clear, 1, 4, 5, 6, 11, 12, 20, 22, 25, 28, 30, 31—12 days. Partly cloudy, 2, 10, 16, 17, 19, 24, 27, 29—8 days. Cloudy, 3, 7, 8, 9, 13, 14, 15, 18, 21, 23, 26—11 days.
 SEPTEMBER.—Clear, 1, 2, 3, 4, 8, 9, 11, 13, 17, 20, 23, 24, 25, 27, 29, 30—16 days. Partly cloudy, 5, 7, 14, 15, 18, 19, 22, 26—9 days. Cloudy, 6, 10, 12, 16, 21—5 days.
 OCTOBER.—Clear, 1, 2, 3, 7, 13, 17—6 days. Partly cloudy, 6, 14, 18, 29—4 days. Cloudy, 4, 5, 8, 9, 10, 11, 12, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31—21 days.
 NOVEMBER.—Clear 2. Partly cloudy, 1, 3, 4, 21, 27—5 days. Cloudy, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 28, 29, 30—24 days.
 DECEMBER.—Clear, 23. Partly cloudy, 1, 2, 3, 4, 5—5 days. Cloudy, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31—25 days.

ALPENA.

JANUARY.—Clear, 8, 18, 24, 25, 26—5 days. Partly cloudy, 11, 12, 13, 15, 23, 31—6 days. Cloudy, 1, 2, 3, 4, 5, 6, 7, 9, 10, 14, 16, 17, 19, 20, 21, 22, 27, 28, 29, 30—20 days.
 FEBRUARY.—Clear, 4, 14, 18, 19, 25, 26, 27, 28—8 days. Partly cloudy, 1, 3, 9, 12, 15, 16, 17, 21, 23, 24—10 days. Cloudy, 2, 5, 6, 7, 8, 10, 11, 13, 20, 22—10 days.
 MARCH.—Clear, 4, 6, 10, 15, 16, 26, 27, 28, 30—9 days. Partly cloudy, 3, 5, 11, 13, 14, 17, 22, 23, 24, 25, 31—11 days. Cloudy, 1, 2, 7, 8, 9, 12, 18, 19, 20, 21, 29—11 days.
 APRIL.—Clear, 1, 3, 10, 11, 20, 27—6 days. Partly cloudy, 2, 4, 6, 7, 8, 9, 12, 14, 15, 21, 25, 26, 28—13 days. Cloudy, 5, 13, 16, 17, 18, 19, 22, 23, 24, 29, 30—11 days.
 MAY.—Clear, 4, 7, 10, 12, 21, 25, 26—7 days. Partly cloudy, 5, 6, 8, 9, 13, 14, 15, 16, 17, 18, 24, 27, 29—13 days. Cloudy, 1, 2, 3, 11, 19, 20, 22, 23, 28, 30, 31—11 days.
 JUNE.—Clear, 8, 13, 15, 18, 21, 22, 24, 25, 26—9 days. Partly cloudy, 1, 4, 5, 7, 9, 10, 11, 12, 14, 16, 20, 23, 27, 28, 30—15 days. Cloudy, 2, 3, 6, 17, 19, 29—6 days.
 JULY.—Clear, 1, 4, 5, 6, 7, 8, 14, 16, 17, 18, 29, 31—12 days. Partly cloudy, 2, 3, 9, 11, 13, 15, 19, 21, 22, 23, 24, 25, 28, 30—14 days. Cloudy, 10, 12, 20, 26, 27—5 days.
 AUGUST.—Clear, 1, 5, 6, 7, 11, 12, 13, 20, 21, 23, 25, 27, 30—13 days. Partly cloudy, 3, 4, 8, 10, 16, 17, 19, 22, 26, 28, 29, 31—12 days. Cloudy, 2, 9, 14, 15, 18, 24—6 days.
 SEPTEMBER.—Clear days, 14. Partly cloudy, 13. Cloudy, 3.
 OCTOBER.—Clear, 1, 2, 3, 4, 15, 17—6 days. Partly cloudy, 7, 12, 13, 14, 16, 18, 19, 23, 24, 26, 27, 28, 29, 30—14 days. Cloudy, 5, 6, 8, 9, 10, 11, 20, 21, 22, 25, 31—11 days.
 NOVEMBER.—Clear, 2, 3. Partly cloudy, 1, 5, 6, 7, 9, 13, 16, 20, 23, 24, 27, 29, 30—13 days. Cloudy, 4, 8, 10, 11, 12, 14, 15, 17, 18, 19, 21, 22, 25, 26, 28—15 days.
 DECEMBER.—Partly cloudy, 1, 2, 5, 8, 9, 16, 21, 26, 27, 28, 30—11 days. Cloudy, 3, 4, 6, 7, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 22, 23, 24, 25, 29, 31—20 days.

PORT HURON.

In the following statement relative to Port Huron (the *per cent* of cloudiness having been recorded for each day), the days are named clear when the sky was three-tenths or less than three-tenths covered with clouds; partly cloudy, when the sky was from four-tenths to seven-tenths (inclusive) covered; cloudy, when the sky was more than seven-tenths covered—as observed by W. M. Edmondson, observer, Weather Bureau, Port Huron.

JANUARY.—Clear, 8, 19, 25, 26, 31—5 days. Partly cloudy, 3, 6, 9, 10, 12, 14, 15, 23, 24—9 days. Cloudy, 1, 2, 4, 5, 7, 11, 13, 16, 17, 18, 20, 21, 22, 27, 28, 29, 30—17 days.
 FEBRUARY.—Clear, 1, 19, 21. Partly cloudy, 2, 14, 17, 18, 24, 25, 26, 27, 28—9 days. Cloudy, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 20, 22, 23—16 days.
 MARCH.—Clear, 7, 16, 26, 28, 31—5 days. Partly cloudy, 4, 6, 10, 11, 12, 13, 14, 15, 21, 25, 27, 30—12 days. Cloudy, 1, 2, 3, 5, 8, 9, 17, 18, 19, 20, 22, 23, 24, 29—14 days.
 APRIL.—Clear, 1, 3, 27. Partly cloudy, 2, 8, 10, 11, 12, 14, 17, 18, 20, 22, 24, 25, 26, 28—14 days. Cloudy, 4, 5, 6, 7, 9, 13, 15, 16, 19, 21, 23, 29, 30—13 days.
 MAY.—Sunny, 5, 7, 8, 10, 16, 17, 22, 26, 27—9 days. Partly cloudy, 4, 6, 9, 11, 12, 15, 18, 19, 21, 25, 29, 31—12 days. Cloudy, 1, 2, 3, 13, 14, 20, 23, 24, 28, 30—10 days.
 JUNE.—Clear, 8, 9, 10, 13, 21, 22, 25, 26, 27—9 days. Partly cloudy, 1, 4, 5, 11, 12, 14, 15, 16, 17, 18, 19, 20, 23, 24, 28, 30—16 days. Cloudy, 2, 3, 6, 7, 29—5 days.
 JULY.—Sunny, 3, 4, 6, 7, 8, 9, 10, 17, 25, 28, 29, 30, 31—13 days. Fair, 1, 2. Cloudy, 11, 19, 26, 27—4 days. No record for the rest of the month.
 AUGUST.—Clear, 2, 3, 5, 6, 7, 12, 13, 17, 20, 24, 25, 26, 29—13 days. Partly cloudy, 1, 4, 9, 10, 11, 15, 16, 19, 21, 22, 27, 28, 30, 31—15 days. Cloudy, 8, 14, 18.
 SEPTEMBER.—Clear, 2, 3, 4, 5, 6, 7, 8, 10, 17, 21, 23, 24, 25, 28, 29, 30—16 days. Partly cloudy, 9, 12, 14, 15, 18, 19, 20, 22, 26, 27—10 days. Cloudy, 1, 11, 13, 16—4 days.
 OCTOBER.—Clear, 1, 2, 3, 4, 9, 10, 13, 14, 15, 17, 22, 23, 24, 25, 26, 27, 28—17 days. Partly cloudy, 5, 7, 12, 18, 19, 29, 30, 31—8 days. Cloudy, 6, 8, 11, 16, 20, 21—6 days.
 NOVEMBER.—Clear, 3, 13, 17, 20, 23—5 days. Partly cloudy, 4, 6, 10, 16, 18, 21, 21, 27, 28—9 days. Cloudy, 1, 2, 5, 7, 8, 9, 11, 12, 14, 15, 19, 22, 25, 26, 29, 30—16 days.
 DECEMBER.—Clear, 24. Partly cloudy, 2, 3, 7, 8, 9, 15, 16, 21, 25, 26, 27, 28—12 days. Cloudy, 1, 4, 5, 6, 10, 11, 12, 13, 14, 17, 18, 19, 20, 22, 23, 29, 30, 31—18 days.

THORNVILLE.

In the following statement relative to Thornville, are named for each of the months, January to December, the days of the month "sunny," "fair" and "cloudy" (the *per cent* of sunshine having been recorded for each day). The days were named sunny when the sky was three-tenths or less than three-tenths covered with clouds; fair, when the sky was four-tenths to seven-tenths (inclusive) covered; cloudy, when the sky was more than seven-tenths covered, as observed by J. S. Calkins, M. D., Thornville.

JANUARY.—Sunny, 8, 10, 11, 12, 14, 15, 19, 24, 25, 26, 31—11 days. Fair, 9. Cloudy, 1, 2, 3, 4, 5, 6, 7, 13, 16, 17, 18, 20, 21, 22, 23, 27, 28, 29, 30—19 days.

FEBRUARY.—Sunny, 14, 17, 18, 19—4 days. Fair, 1. Cloudy, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 20, 21, 22, 23, 24, 25, 26, 27, 28—23 days.
 MARCH.—Sunny, 6, 7, 10, 11, 13, 16, 21, 26, 27, 28, 30, 31—12 days. Fair, 4, 14, 15, 22, 25, 29—6 days. Cloudy, 1, 2, 3, 5, 8, 9, 12, 17, 18, 19, 20, 23, 24—13 days.
 APRIL.—Sunny, 1, 2, 19, 20, 27—5 days. Fair, 2, 5, 8, 10, 11, 12, 14, 17, 18, 22, 23, 26, 28—13 days. Cloudy, 4, 6, 7, 9, 13, 15, 16, 21, 24, 25, 29, 30—12 days.
 MAY.—Sunny, 5, 6, 7, 8, 10, 11, 12, 15, 16, 17, 19, 21, 22, 23, 27—15 days. Fair, 4, 9, 13, 18, 23, 25, 29, 30, 31—9 days. Cloudy, 1, 2, 3, 14, 20, 24, 28—7 days.
 JUNE.—Sunny, 1, 5, 8, 9, 10, 12, 13, 14, 18, 21, 22, 24, 25, 26, 27, 30—16 days. Fair, 3, 4, 11, 15, 16, 17, 19, 20, 23, 25—10 days. Cloudy, 2, 6, 7, 29—4 days.
 JULY.—Sunny, 1, 2, 3, 4, 6, 7, 8, 9, 15, 17, 22, 24, 25, 29, 30, 31—16 days. Fair, 5, 10, 12, 14, 16, 18, 19, 21, 23, 28—11 days. Cloudy, 11, 13, 26, 27—4 days.
 AUGUST.—Sunny, 1, 2, 3, 5, 6, 7, 10, 13, 17, 19, 20, 21, 22, 26, 27, 28, 30—18 days. Fair, 8, 9, 11, 14, 15, 23, 24, 25, 31—9 days. Cloudy, 4, 16, 18, 29—4 days.
 SEPTEMBER.—Sunny, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30—24 days. Fair, 12, 14. Cloudy, 1, 11, 13, 16—4 days.
 OCTOBER.—Sunny, 1, 2, 3, 4, 5, 7, 9, 10, 12, 13, 14, 15, 17, 18, 19, 23, 24, 25, 26, 27, 29, 30—22 days. Fair, 8, 16, 22, 28—4 days. Cloudy, 6, 11, 20, 21, 31—5 days.
 NOVEMBER.—Sunny, 3, 4, 10, 12, 13, 16, 20, 28—8 days. Fair, 6, 17, 23, 24, 27—5 days. Cloudy, 1, 2, 5, 7, 8, 9, 11, 14, 15, 18, 19, 21, 22, 25, 26, 29, 30—17 days.
 DECEMBER.—Sunny, 24, 27, 28. Fair, 2, 3, 16. Cloudy, 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 25, 26, 29, 30, 31—25 days.

LANSING.

JANUARY.—Sunny, 8. Partly cloudy, 4, 9, 12, 14, 18, 19, 24, 25, 30, 31—10 days. Cloudy, 1, 2, 3, 5, 6, 7, 10, 11, 13, 15, 16, 17, 20, 21, 22, 23, 26, 27, 28, 29—20 days.
 FEBRUARY.—Partly cloudy, 1, 14, 15, 18, 19, 23, 24, 25, 26, 28—10 days. Cloudy, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 20, 21, 22, 27—18 days.
 MARCH.—Sunny, 10, 16, 28, 29, 30, 31—6 days. Partly cloudy, 3, 7, 11, 13, 14, 15, 21, 24, 25, 26, 27—11 days. Cloudy, 1, 2, 4, 5, 6, 8, 9, 12, 17, 18, 19, 20, 22, 23—14 days.
 APRIL.—Sunny, 3, 20, 27. Partly cloudy, 1, 2, 11, 12, 14, 17, 18, 19, 22, 25, 26, 28—12 days. Cloudy, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 21, 23, 24, 29, 30—15 days.
 MAY.—Sunny, 5, 7, 8, 10, 15, 16, 21, 25, 26, 27, 31—11 days. Partly cloudy, 4, 9, 11, 12, 14, 17, 18, 19, 22, 23, 24, 29, 30—13 days. Cloudy, 1, 2, 3, 6, 13, 20, 28—7 days.
 JUNE.—Sunny, 8, 9, 13, 14, 20, 21, 22, 25—8 days. Partly cloudy, 1, 2, 4, 5, 6, 7, 10, 11, 12, 15, 24, 26, 27, 28, 29, 30—16 days. Cloudy, 3, 16, 17, 18, 19, 23—6 days.
 JULY.—Sunny, 3, 4, 5, 6, 7, 8, 9, 14, 18, 21, 29—11 days. Partly cloudy, 1, 2, 10, 11, 16, 17, 19, 20, 22, 23, 24, 25, 28, 30, 31—15 days. Cloudy, 12, 13, 15, 26, 27—5 days.
 AUGUST.—Sunny, 1, 5, 12, 13, 20, 21, 25, 26, 27, 30—10 days. Partly cloudy, 2, 3, 6, 7, 8, 9, 10, 11, 14, 15, 17, 19, 22, 23, 24, 28—16 days. Cloudy, 4, 16, 18, 29, 31—5 days.
 SEPTEMBER.—Sunny, 3, 4, 5, 8, 9, 10, 14, 17, 20, 22, 23, 24, 25, 27, 28, 29, 30—17 days. Partly cloudy, 7, 12, 15, 16, 18, 19, 21, 26—8 days. Cloudy, 1, 2, 6, 11, 13—5 days.
 OCTOBER.—Sunny, 1, 2, 3, 4, 5, 7, 9, 10, 12, 15, 17, 25, 30—13 days. Partly cloudy, 6, 8, 13, 14, 19, 23, 24, 26, 27, 28, 29—11 days. Cloudy, 11, 16, 18, 20, 21, 22, 31—7 days.
 NOVEMBER.—Sunny, 3. Partly cloudy, 2, 4, 6, 12, 13, 16, 17, 18, 19, 20, 22, 23, 24, 27, 28—15 days. Cloudy 1, 5, 7, 8, 9, 10, 11, 14, 15, 21, 25, 26, 29, 30—14 days.
 DECEMBER.—Sunny, 27. Partly cloudy, 1, 8, 16, 18, 23—5 days. Cloudy, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 19, 20, 21, 22, 24, 25, 26, 28, 29, 30, 31—25 days.

ANN ARBOR.

JANUARY.—Sunny, 8, 9, 14, 25, 31—5 days. Fair, 7, 22, 24, 26—4 days. Cloudy, 1, 2, 3, 4, 5, 6, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 23, 27, 28, 29, 30—22 days.
 FEBRUARY.—Sunny, 14, 24, 27. Fair, 2, 18, 19, 23, 25, 26, 28—7 days. Cloudy, 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 20, 21, 22—18 days.
 MARCH.—Sunny, 7, 10, 15, 16, 21, 26, 27, 28, 29, 30, 31—11 days. Fair, 6, 11, 13, 14, 22, 24, 25—7 days. Cloudy, 1, 2, 3, 4, 5, 8, 9, 12, 17, 18, 19, 20, 23—13 days.
 APRIL.—Sunny, 1, 3, 18, 20, 27—5 days. Fair, 2, 5, 10, 12, 14, 15, 19, 22, 25, 26, 28—11 days. Cloudy, 4, 6, 7, 8, 9, 11, 13, 16, 17, 21, 23, 24, 29, 30—14 days.
 MAY.—Sunny, 5, 7, 8, 10, 11, 15, 16, 17, 26, 27—10 days. Fair, 9, 12, 13, 19, 21, 22, 25, 31—8 days. Cloudy, 1, 2, 3, 4, 6, 14, 18, 20, 23, 24, 28, 29, 30—13 days.
 JUNE.—Sunny, 1, 8, 9, 14, 15, 20, 21, 22, 24, 25, 26—11 days. Fair, 2, 5, 10, 11, 12, 13, 16, 19, 27, 28, 29, 30—12 days. Cloudy, 3, 4, 6, 7, 17, 18, 23—7 days.
 JULY.—Sunny, 3, 4, 5, 6, 7, 8, 9, 20, 25, 29—10 days. Fair, 2, 10, 19, 21, 22, 23, 24, 28, 30, 31—10 days. Cloudy, 1, 11, 12, 13, 14, 15, 16, 17, 18, 26, 27—11 days.
 AUGUST.—Sunny, 12, 13, 15, 17, 18, 20, 21, 25, 26, 27, 28, 30—12 days. Fair, 2, 5, 6, 8, 11, 19, 22, 23, 24—9 days. Cloudy, 1, 3, 4, 7, 9, 10, 14, 16, 29, 31—10 days.
 SEPTEMBER.—Sunny, 3, 4, 5, 8, 9, 10, 14, 17, 18, 20, 23, 24, 25, 27, 28, 29, 30—17 days. Partly cloudy, 6, 7, 15, 19, 21, 22, 26—7 days. Cloudy, 1, 2, 11, 12, 13, 16—6 days.
 OCTOBER.—Sunny, 1, 2, 3, 4, 7, 8, 9, 10, 12, 13, 17, 19, 23, 24, 25, 26, 27, 30—18 days. Cloudy, 5, 6, 11, 14, 15, 16, 18, 20, 21, 22, 28, 29, 31—13 days.
 NOVEMBER.—Sunny, 3, 4, 13—3 days. Partly cloudy, 6, 12, 19, 20, 23, 27, 28—7 days. Cloudy, 1, 2, 5, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 21, 22, 24, 25, 26, 29, 30—20 days.
 DECEMBER.—Sunny, 3, 16, 23, 24, 27—5 days. Partly cloudy, 18, 19, 22, 25, 26, 28—6 days. Cloudy, 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 20, 21, 29, 30, 31—20 days.

DETROIT.

JANUARY.—Clear, 12, 19, 24, 25, 26, 31—6 days. Partly cloudy, 6, 8, 9, 10, 14, 18, 28—7 days. Cloudy, 1, 2, 3, 4, 5, 7, 11, 13, 15, 16, 17, 20, 21, 22, 23, 27, 29, 30—18 days.

FEBRUARY.—Clear, 14, 19, 24, 27—4 days. Partly cloudy, 2, 10, 17, 18, 25, 28—6 days. Cloudy, 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 20, 21, 22, 23, 26—18 days.

MARCH.—Clear, 7, 10, 11, 13, 16, 21, 28, 29, 30, 31—10 days. Partly cloudy, 4, 6, 14, 15, 22, 25, 26, 27—8 days. Cloudy, 1, 2, 3, 5, 8, 9, 12, 17, 18, 19, 20, 23, 24—13 days.

APRIL.—Clear, 1, 2, 3, 13, 20, 27, 28—7 days. Partly cloudy, 10, 12, 19, 22, 24, 26—6 days. Cloudy, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 21, 23, 25, 29, 30—17 days.

MAY.—Clear, 5, 8, 10, 15, 22, 25, 26, 31—8 days. Partly cloudy, 4, 7, 9, 11, 12, 13, 16, 17, 19, 21, 24, 30—12 days. Cloudy, 1, 2, 3, 6, 14, 18, 20, 23, 27, 28, 29—11 days.

JUNE.—Clear, 1, 5, 8, 9, 10, 12, 13, 14, 20, 21, 22, 23, 24, 25, 26, 27—16 days. Partly cloudy, 2, 4, 6, 11, 15, 18, 19, 23, 29, 30—10 days. Cloudy, 3, 7, 16, 17—4 days.

JULY.—Clear, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 20, 22, 23, 24, 25, 29, 30, 31—18 days. Partly cloudy, 1, 2, 12, 16, 17, 18, 19, 21, 28—9 days. Cloudy, 11, 13, 26, 27—4 days.

AUGUST.—Clear, 2, 5, 6, 7, 12, 13, 20, 21, 22, 25, 26, 27, 28, 30—14 days. Partly cloudy, 1, 3, 9, 10, 11, 14, 17, 19, 29, 31—10 days. Cloudy, 4, 8, 15, 16, 18, 23, 24—7 days.

SEPTEMBER.—Clear, 3, 4, 5, 8, 9, 10, 14, 15, 17, 18, 19, 20, 21, 23, 24, 25, 27, 28, 29, 30—20 days. Partly cloudy, 6, 7, 12, 13, 16, 22, 26—7 days. Cloudy, 1, 2, 11.

OCTOBER.—Clear, 1, 2, 3, 4, 9, 12, 14, 15, 17, 18, 24, 25, 30—13 days. Partly cloudy, 5, 6, 7, 10, 13, 16, 19, 26, 27, 28, 29—11 days. Cloudy, 8, 11, 20, 21, 22, 23, 31—7 days.

NOVEMBER.—Clear, 3, 4, 13, 28—4 days. Partly cloudy, 6, 12, 20, 21, 23, 24, 29—7 days. Cloudy, 1, 2, 5, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 22, 25, 26, 27, 30—19 days.

DECEMBER.—Clear, 8, 13, 22, 24, 28—5 days. Partly cloudy, 1, 3, 14, 16, 19, 21, 23, 27, 31—9 days. Cloudy, 2, 4, 5, 6, 7, 9, 10, 11, 12, 13, 15, 17, 20, 25, 26, 28, 30—17 days.

THE TIME OF GREATEST PREVALENCE OF EACH DISEASE.

CONTRIBUTIONS TO THE STUDY OF THE CAUSES OF SICK- NESS.

A STATISTICAL REPORT BASED ON WEEKLY REPORTS OF SICKNESS
IN MICHIGAN DURING THE YEAR 1897, AND PRECEDING YEARS.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE
BOARD OF HEALTH.

This paper is the twenty-first in a series of articles upon the same general subject begun in the latter part of 1876. It presents a summary of the compilation of weekly reports of sickness in Michigan in 1897. It includes a series of graphic illustrations which show by months, in 1897, the rise and fall of twenty-eight of the most prominent diseases in Michigan.

Propositions are stated as to the relations of specified meteorological conditions, and diseases are mentioned under these propositions in such manner as to suggest one method of studying some of the facts brought out in the compilation.

Tables are given showing the per cent of the weekly *reports* which stated the presence of the various diseases, first (in Exhibit IV.), for each of the years, 1885-1897, and an average for the twenty years, 1877-1896, also for the eleven years, 1886-1896, and secondly (in Exhibit IV., continued), by months, in each of the years 1896, 1897, and the average for the period of twenty years, 1877-1896, also for the period of eleven years, 1886-1896, the diseases being arranged in the order of their greatest reported prevalence in 1897, to facilitate a comparison with the prevalence of the same diseases in previous years, and in corresponding months in previous years.

The per cent of *observers* stating the presence of each of the diseases is given in Table 1, for the year 1897, and, for comparison, for each of the years 1885-1896, and, in Table 1, continued, for the months in the year 1897, and, for comparison, by months in the year 1896, and the average by months for the period of twenty years, 1877-1896, also for the period of eleven years, 1886-1896.

Comparing Table 1 with Exhibit IV., we see the correspondence in the two lines of evidence,—that of the “prevalence” of the diseases as shown by the per cent of *reports*, and the “area of prevalence” as shown by the per cent of *observers*, the diseases following each other in a somewhat similar order from highest to lowest—the diseases being arranged in the table, as in the exhibit, in the order of their greatest reported prevalence in 1897.

One of the objects of this compilation is to learn the time of the greatest and of the least prevalence of each of the more important diseases in the State, and to note the connection of this prevalence with each of the meteorological conditions in the State. Casual observation shows

that certain diseases are much more prevalent in the hot months, while certain other diseases are much more prevalent in the cold months. The relation between these diseases and the atmospheric temperature is well marked, but accurate statistics are needed to show just what that relation is. We find, also, that other meteorological conditions than atmospheric temperature have a marked effect upon many of the diseases, apparently diminishing the effect of temperature in some instances, increasing its effect in other instances. For these reasons the State Board of Health undertakes, by a compilation of the weekly reports of sickness in connection with the various meteorological conditions, to learn what constant, and, therefore, probably causal relations exist between the humidity of the air, the ozone, the velocity of the wind, the atmospheric pressure, etc., and the increased or diminished prevalence of each disease in certain months as compared with other months in the same year, or with the same months in other years or series of years.

Since 1876, when this system of "weekly reports of sickness" was begun, an important work has been accomplished in learning the time of the greatest prevalence of each of several of the most important diseases, and consequently the time of greatest danger from each such disease, in the State considered as a unit. To facilitate the study of the causes of sickness and deaths, the State is divided into eleven geographical divisions, a list of which, and the counties embraced in each, appear in Exhibit I.

Physicians' Weekly Reports of Sickness.

Weekly reports are now received concerning twenty-eight diseases, the names of which are printed on the blank postal used for the weekly report; and concerning these twenty-eight diseases a positive report is made each week by each of many of the leading physicians in Michigan.

Great credit is due the busy medical practitioners in Michigan who forward these reports of sickness. Some of them have made the reports regularly since this plan was adopted in 1876. The service is, as a rule, without compensation; a few health officers have slight pay from their local boards of health. Each one should have full compensation. No other class of persons has knowledge of the facts that are necessary in the compilation of health statistics; and it is greatly to the credit of physicians that they are so willing to coöperate in every effort made to advance the public health.

Plan of the Weekly Card Reports.

The plan of the weekly reports remains the same as last year. (Cards having *Pleuritis* printed on them were first used for weekly reports in October, 1887.) Observers now report only the diseases under their own personal observation. Previous to the year 1885, some of the observers reported such diseases as they believed to be present in their locality, even though not under their own observation. The change in method of making the reports may account partially for the apparent decrease in sickness in 1897, when compared with the average for the twenty years, 1877-96. Details of the method of securing and the plan of marking these reports may be thus stated:—

The blanks for the weekly reports are printed on postal cards, which are supplied to the observers of diseases. Blank record books in which to preserve copies of the reports, remarks, etc., are also supplied to these observers, to be retained by them. The reports are forwarded weekly to the Secretary of the State Board of Health at Lansing.

The plan of making the report is as follows: Each observer is requested to mark the disease of which there was the greatest number of cases under his observation during the week for which the report is made, 1; that of which there was the next greatest number of cases, 2; the next, 3; and so on, applying *consecutive* numbers to the diseases reported present; but marking with the *same* figure all diseases of which there is the same number of cases; to write 0 opposite each disease mentioned of which there was no case; to apply these numbers without regard to the severity of the cases; to include all cases, without regard to when they were taken sick, so long as they are actually sick with the given disease; to include all cases "under the observation" of the observer. A blank is left on the card for the convenience of those observers who prefer to state the number of cases rather than the order of prevalence by the foregoing method.

To illustrate the method of making the reports, the following copy of one of the blanks now in use is given, correctly marked, in the "prevalence" column, for the number of cases stated on the right-hand margin. It should be remembered that the numbers in the "prevalence" column denote simply the relative order in which the several diseases appear to be prevalent, and do not denote a definite number of cases; so that a disease might one week be marked 4, and the following week, with the same number of cases, be marked 1. Names of diseases printed in italics are not *printed* on the postal blanks, but are supposed to have been *written* on the report by the observer.

Diseases in.....and vicinity.

PLEASE DATE.

Week ending Sat.,....., 189.....

		DISEASES, CASES OBSERVED.	
REMARKS.—If this report includes a contagious disease, please mention, on the bottom or margin of this card, the township, city, or village in which the disease is.	Ed. 43.	Preval'nce Order.	No. of Cases.
		See a	
a. Please mark the disease of which there is the greatest number of cases, 1; the disease having next greatest number of cases, 2; the next, 3; and so on for each disease, writing the same figures opposite diseases having the same number of cases. Write 0 opposite each disease of which there is no case under your observation. [For full statement of plan, see second, third, and fourth pages of record-book cover.] A blank indicates that the item has been overlooked. Please mail this, signed signed and dated, as soon as convenient after close of week specified.	a. Please mark the disease of which there is the greatest number of cases, 1; the disease having next greatest number of cases, 2; the next, 3; and so on for each disease, writing the same figures opposite diseases having the same number of cases. Write 0 opposite each disease of which there is no case under your observation. [For full statement of plan, see second, third, and fourth pages of record-book cover.] A blank indicates that the item has been overlooked. Please mail this, signed signed and dated, as soon as convenient after close of week specified.	Brain, Inflammation of....	14 1
		Bowels, Inflammation of....	12 3
		Bronchitis.....	11 4
		Cerebro-spinal Meningitis.....	0 0
		Cholera Infantum.....	8 9
		Cholera Morbus.....	10 6
		Consumption, Pulmonary.....	10 6
		Croup, Membranous.....	12 3
		Diphtheria.....	5 14
		Diarrhea.....	3 17
		Dysentery.....	8 9
		Erysipelas.....	13 2
		Fever, Intermittent.....	2 21
		Fever, Remittent.....	11 4
		Fever, Typhoid (Enteric).....	0 0
		Fever, Typho-malarial.....	9 7
		Influenza.....	7 11
		Kidney, Inflammation of....	14 1
		Measles.....	1 27
		Neuralgia.....	14 1
		Plenritis.....	0 0
		Pneumonia.....	9 7
		Puerperal Fever.....	0 0
		Rheumatism.....	6 12
		Scarlet Fever.....	4 16
		Small-pox.....	0 0
		Tonsillitis.....	11 4
		Whooping-cough.....	0 0
		Mumps.....	6 12
		Dyspepsia.....	11 4

• *Bulletins of Health in Michigan.*

During the year 1897 the issue of the weekly and monthly bulletins of "Health in Michigan" has been continued. These bulletins are compiled from the regular weekly card reports of physicians in all parts of the State, and from the health officers' reports of communicable diseases, which reports are made to the Secretary of the State Board of Health in compliance with law.

The bulletins give to the members of the State Board of Health, local health officers, and when published to the public, information concerning the "diseases which cause most sickness" in the State, the relative amount of sickness from each disease, and comparisons with the preceding week or month, thus showing any sudden increase or decrease which may have occurred in the prevalence of any disease, together with a comparison of the various meteorological conditions; also (in the monthly bulletin) a comparison with the average month for a series of years, also (in the weekly bulletin) lists of the localities in which each of the dangerous communicable diseases is reported present, which lists if widely published would serve to put people intending to visit such places on their guard against such diseases.

The bulletins are an immediate ephemeral use of some of the data supplied by the reports from localities, which data finally go to make up the permanently-valuable sickness statistics, and the communicable-disease statistics of Michigan; but even this ephemeral use has been the means of disseminating among the people of Michigan much information useful for the restriction and prevention of sickness and deaths.

There are fifteen hundred and eighty-nine cities, villages, and townships in Michigan, each of which is required by law to have a health officer, and nearly every one of them contributes some fact, and some of them very many facts, useful for the promotion of the public health. The State Board of Health serves to collect these facts, group them so as to make them most useful, and give them all out again to every locality for the general good.

A copy of the weekly bulletin has been sent to such editors as have expressed a desire to have it for use, entire or in part, in their papers; and copies of the monthly bulletin have been sent to the sanitary and medical journals which are received as exchanges by the library of the State Board of Health.

About fifty copies of the weekly bulletin were mailed each week, and about one hundred and ten copies of the monthly bulletin were mailed each month, during the year 1897.

As a rule, about five-eighths of the card reports reach the office of the State Board of Health in time for compilation in the weekly bulletin, and the monthly bulletins are compiled from the information used in the weekly bulletins. It is found that the statements made in the monthly bulletins are corroborated by the information, after the close of the year, from the compilation of the whole number of the reports for the corresponding months of the year.

Annual Compilation of the Weekly Reports.

The reports from each locality are compiled by months. The average of the numbers stating the order of prevalence of the several diseases for the month is considered an indication of the actual order of prevalence of the diseases for that time. There is also found for each locality what

per cent of the reports states the presence of each disease for the given month. This per cent of reports for a single locality indicates what portion of the month the disease was present in that locality. It may also be called the per cent of weeks the disease was present. These first results of the compilation are stated in Table 3, which, on account of the space required, has not been printed in the reports since that of 1882, but is preserved in the office of the State Board for reference and study.

A combination of the statements for localities in Table 3 is made by months for the State, so far as it is represented by the localities from which reports are received, showing: (1) What per cent of the observers reported each disease each month; (2) for the localities at which a given disease was reported, an average of the per cent of weeks it was reported at those localities; (3) what per cent of all the reports received for the month stated the presence of each disease; (4) an average of the numbers denoting the order of prevalence of each disease at the localities at which it was reported present during the month.

The Prevalence of the Several Diseases in 1897.

By noting the per cent of all the reports received for a given time which stated the presence of each disease, the relative prevalence of the several diseases may be readily seen. This per cent has been computed for each disease, by months for the year 1897. It is thus stated in Exhibit II., which also states the per cent for each disease for the year 1897, and an average for the period of twenty years, 1877-1896, also for the period of eleven years, 1886-1896. What per cent of the reports stated the presence of each disease by months in 1897, is graphically represented in Diagrams 1-5 on following pages.

For twenty diseases a comparison has been made of the amount of sickness in 1897 (as indicated by the proportion of reports stating the presence of the disease) with the average amount for a period of twenty years, also for a recent period of eleven years. These comparisons are shown in Exhibits XI., XIII., XVIII. and XX. A comparison is made in Table 1, between the per cents of observers reporting the tabulated diseases present in each of the years 1885-1897, and by months in two of those years; also an average by months for the period of twenty years, 1877-1896, also for the period of eleven years, 1886-1896. In Exhibit IV., the per cents of reports stating the presence of each of the twenty-eight tabulated diseases, for each of the years 1885-1897, and an average by months for the years 1896 and 1897, and for the period of twenty years, 1877-1896, also for the period of eleven years, 1886-1896, is given. In Table 1, and in Exhibit IV., the diseases are arranged in the order of the greatest per cents for 1897, the highest being placed first.

A study of the reported sickness from twenty-one diseases, in connection with meteorological conditions by months in 1897, is made in Exhibit X., and following exhibits. By arranging months in order of greatest prevalence of the disease under consideration, noting whether it is more or less prevalent than the average for the year, and noting what were the meteorological conditions for the same months as compared with the average for the year, relations and comparisons are grouped for convenient comparison. A summary of one line of the evidence presented by these exhibits is given in Exhibits XXV. and XXVI.

In Exhibits VI. and VII., on subsequent pages, the leading diseases are arranged in order according to the amount of sickness reported from

them in 1897, those from which there was most sickness reported being placed first. In these exhibits the diseases are arranged with reference to the per cent of reports taken in connection with the average order of prevalence.

The comparison with former years is facilitated by reference to Exhibit IV., Table 1, and Exhibits XI., XIII., XVIII. and XX.

Exhibit IV. is continued for 1897. In it the diseases are arranged in order of the greatest per cent of reports stating the presence of the diseases in 1897, the highest per cent being placed first in the line. It is similar in form to Table 1, which shows the per cent of observers by whom diseases were reported present. It affords a means of comparing the diseases showing greatest prevalence with those showing greatest area of prevalence or widest distribution. It affords also a means for the comparison of per cent of reports in 1897 with the average per cent of reports in the twenty years, 1877-1896, also in the eleven years, 1886-1896, both for the year and by months, also by months in 1897 with the year 1896.

Diseases from which there was a Marked Increase or Decrease in Prevalence in Michigan in 1897.

By referring to Exhibits II. and IV., it will be seen that there was no disease which showed a marked increase in 1897 over the average for the twenty years, 1877-1896; the diseases in which the decrease in 1897 appears most marked, when compared with the above-mentioned average, are intermittent fever, remittent fever, pneumonia, typhoid fever, typho-malarial fever, diphtheria, consumption, erysipelas, scarlet fever, dysentery, cholera morbus, cholera infantum, inflammation of bowels and whooping-cough.

A part of the lessened prevalence of some of the prominent diseases may be due to the change in the method of reporting sickness, referred to in the last paragraph on page 84.

A comparison of 1897 with the average for the eleven years, 1886-1896, shows that the only disease which showed a marked increase in 1897 was measles; the diseases in which the decrease appears most marked in 1897, when compared with the last-named average, are intermittent fever, remittent fever, typhoid fever, typho-malarial fever, whooping-cough, consumption, pneumonia, scarlet fever, cholera infantum, cholera morbus and inflammation of bowels.

Method of Comparison of Diseases by Years, Months, and Weeks.

In the Annual Reports ending with that for 1888, mention was made of diseases in which a difference of seven or more was shown between the per cents of reports stating the presence of the disease in the current year and in the preceding year or term of years; in the Reports since that for 1888 those diseases were mentioned of which the comparison showed an increase or decrease of twenty-five per cent from the preceding year, or from the normal, as the case may be.

In this report, those diseases which are reported by seven or more observers, and which show an increase or decrease of twenty-five per cent are generally mentioned, except in cases of cholera, small-pox, typhus fever or other particularly interesting or dangerous disease, and these are specially considered in each instance.

This rule was adopted also for the weekly and monthly bulletins, "Health in Michigan," beginning with Feb., 1893.

In Exhibits XI, XIII, XVIII, and XX., the per cent of reports by months in 1897 is placed directly under the per cents for the corresponding months in 1896. A comparison between the corresponding months in the two years is thus made possible, and the comparison of the months in 1897 with the averages for the months in the series of 12 years preceding is made possible by placing the differences, greater or less, in separate lines.

EXHIBIT I.—*Eleven Geographical Divisions of the State, formed for the purpose of facilitating the study of Causes of Sickness and of Deaths, with a list of Counties included in each Division.*

1.—Upper Peninsula.	2.—Northwestern.	3.—Northern.	4.—Northeastern.	5.—Western.	6.—Northern Central.	7.—Bay and Eastern.	8.—Central.	9.—Southwestern.	10.—Southern Central.	11.—Southeastern.
Alger.	Benzie.	Antrim.	Alcona.	Kent.	Clare.	Arenac.	Barry.	Allegan.	Branch.	Macomb.
Baraga.	Gr. Traverse.	Charlevoix.	Alpena.	Lake.	Gladwin.	Bay.	Clinton.	Berrien.	Calhoun.	Monroe.
Chippewa.	Leelanau.	Cheboygan.	Iosco.	Mason.	Isabella.	Huron.	Eaton.	Cass.	Hillsdale.	Oakland.
Delta.	Manistee.	Crawford.	Montmorency.	Muskegon.	Mecosta.	Lapeer.	Genesee.	Van Buren.	Jackson.	Wayne.
Dickinson.	Wexford.	Emmet.	Ogemaw.	Newaygo.	Midland.	Saginaw.	Gratiot.		Kalamazoo.	
Gogebie.		Kalkaska.	Oscoda.	Oceana.	Rosecommon.	Sanilac.	Ingham.		Lenawee.	
Houghton.		Otsego.	Presque Isle.	Ottawa.	Missaukee.	St. Clair.	Ionia.		St. Joseph.	
Iron.					Osceola.	Tuscola.	Livingston.		Washtenaw.	
Keweenaw.							Montcalm.			
Luce.							Shiawassee.			
Mackinac.										
Marquette.										
Menominee.										
Ontonagon.										
Schoolcraft.										

On pages 201 and 217 of the Report of this Board for 1886, the divisions and the counties in each were indicated by lines on maps of the State.

EXHIBIT II.—*Stating for the Year, and for each Month of the Year 1897, what Per Cent of the Reports received stated the presence of each of 28 Diseases; also an Average for the period of Twenty Years, 1877-1896, and an Average for the period of Eleven Years, 1886-1896.**

Diseases.	What Per Cent of the reports received stated the Presence of the Disease.														
	Av. 1877- 1896.	Av. 1886- 1896.	Av. Year 1897.	Months, 1897.											
				Jan.	Feb.	Mar.	Apr.	May.	Jun.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Average disease†-----	26	22	18	18	18	19	18	17	16	17	18	19	19	17	16
Brain, inflammation of.....	5	4	2	2	2	2	1	2	3	4	3	2	3	2	2
Bowels, inflammation of.....	14	14	10	6	7	7	8	10	11	16	15	14	13	7	9
Bronchitis.....	59	56	50	59	66	63	60	46	46	35	40	41	43	47	53
Cerebro-spi. meningitis.....	3	2	1	1	1	2	2	3	2	0.3	0.3	3	0.6	0.9	1
Cholera infantum.....	12	11	8	0	0.3	0.2	0.3	3	5	16	22	27	17	2	0.3
Cholera morbus.....	17	15	10	1	3	3	4	3	6	20	27	28	21	5	1
Consumption, pul.....	52	43	20	22	20	23	21	22	22	23	22	18	16	14	13
Croup, membranous.....	5	3	0.7	2	0.5	1	0.6	0.9	0.5	0.3	0	0.5	0.6	0.9	1
Diphtheria.....	14	7	5	8	6	5	5	5	3	5	2	1	6	6	6
Diarrhea.....	45	43	34	14	19	19	20	24	27	46	63	66	58	34	22
Dysentery.....	17	15	12	4	4	6	4	6	6	16	24	30	29	9	7
Erysipelas.....	21	18	14	13	15	16	17	16	13	12	12	11	13	14	14
Fever, intermittent.....	53	35	17	12	12	10	14	13	18	17	24	28	24	19	12
Fever, remittent.....	36	25	11	10	9	9	11	11	13	16	15	16	13	10	5
Fever, typhoid (enteric).....	11	10	7	3	5	3	0.9	3	5	4	12	10	14	12	7
Fever, typho-malarial.....	15	9	0.9	0	0.3	0.7	0.3	0.9	0.7	2	4	2	0	0	0.8
Influenza.....	41	41	47	63	72	75	65	45	29	21	24	33	34	40	53
Kidney, inflam'ation of.....	20	19	17	15	14	17	17	17	19	23	18	15	17	19	18
Measles.....	11	8	13	8	12	17	24	32	25	12	8	4	3	7	9
Neuralgia.....	63	61	58	59	58	66	66	61	54	53	53	53	56	59	61
Pleuritis.....	†17	18	22	21	25	26	19	13	11	11	13	15	16	19	
Pneumonia.....	31	25	19	31	35	34	27	24	10	3	4	6	10	17	20
Puerperal fever.....	4	4	2	3	2	4	2	3	3	2	3	2	2	2	1
Rheumatism.....	67	65	66	67	65	65	65	66	68	67	60	67	66	68	66
Scarlet fever.....	14	10	4	4	5	1	5	3	5	4	3	4	3	6	8
Small-pox.....	0.8	0.5	.05	0	0	0	0.6	0	0	0	0	0	0	0	0
Tonsillitis.....	47	46	43	57	53	50	46	45	34	30	38	30	38	46	46
Whooping-cough.....	15	11	4	3	2	2	3	5	4	9	8	5	4	5	3
Total No. reports rec'd.....	§379	§415	§368	377	387	438	333	319	432	351	336	392	345	322	386

* For 1897 the names of observers are stated in Exhibit V.

† This line is an average for such of the tabulated diseases as were reported present in the given month or year.

‡ An average for the period, 1888-1896.

§ Averages per month.

Statements in this exhibit for months in 1897 are graphically represented in Diagrams 1, 2, 3, 4, 5, opposite this page, and on following pages.

DIAGRAM I—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1897.

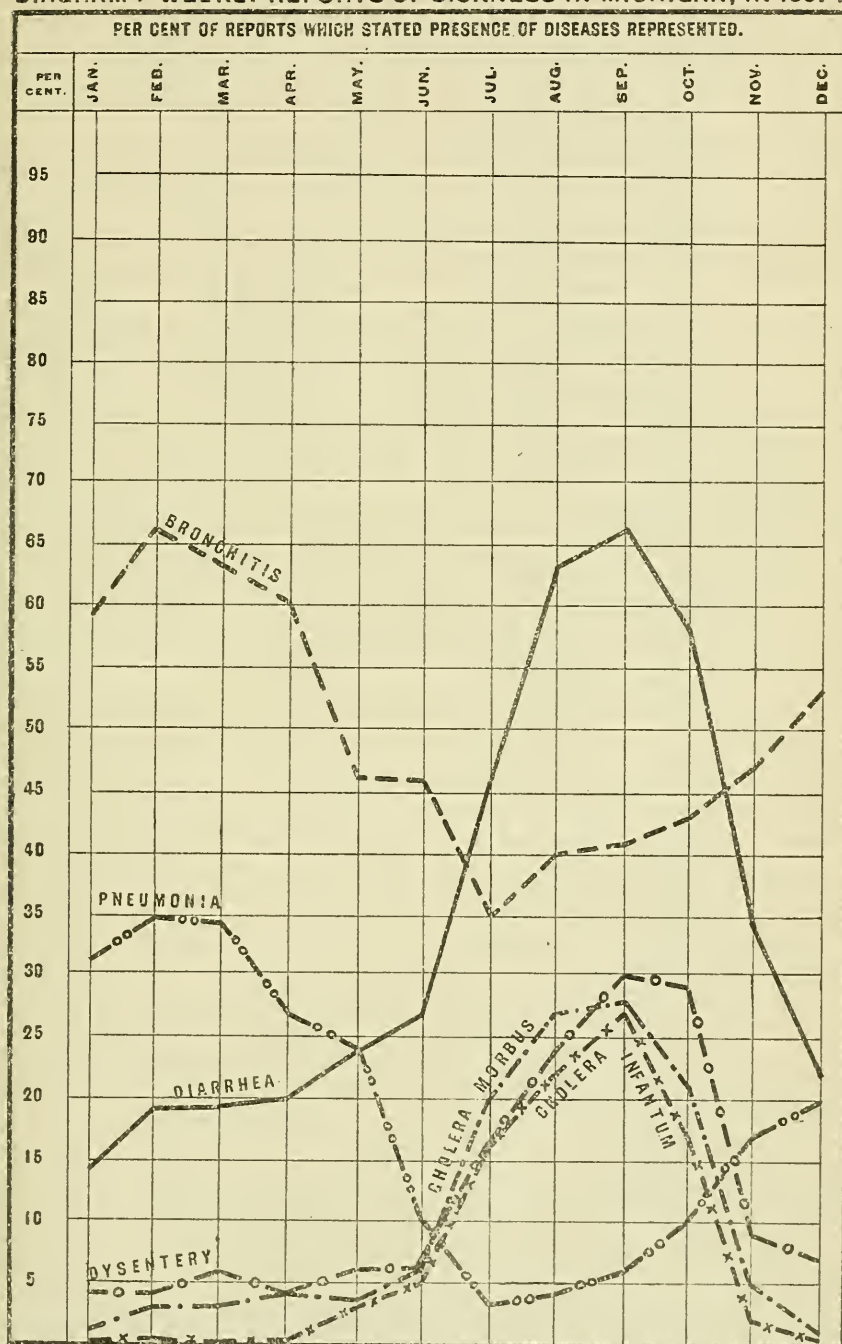


EXHIBIT III.—*Stating, by Months of the Year ending Saturday, January 1, 1898, for the State, and for each of the Eleven Geographical Divisions of Michigan from which Weekly Reports of Diseases were received, the number of Observers from whom the Reports were received; the number of reports received; the day on which, for the purposes of this compilation, each month is made to end; and the number of Weeks thus included in each Month.*

Months, 1897.	Months and Year end Saturday.	Number of Weeks.	State.		Divisions of the State.*																					
			Observers.+	Reports.+	1. Pen- insular.*		2. North- western.*		3. North- ern.*		4. North- eastern.*		5. West- ern.*		6. Northern Central.*		7. Bay and Eastern.*		8. Central.*		9. South- western.*		10. Southern Central.*		11. South- eastern.*	
					Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+	Observers.+	Reports.+
Year, 1897+...	Jan. 1, 1898...	52	167	4,418	8	198	8	281	12	315	5	105	18	464	5	90	18	559	31	843	17	396	33	805	12	357
Av. per month		-----	95	368	5	17	6	23	7	26	2	9	10	39	2	8	11	47	18	71	9	33	18	67	8	30
January.....	January 30....	4	102	377	4	13	5	19	8	28	3	12	13	47	2	8	11	42	19	73	10	36	19	69	8	30
February.....	February 27....	4	107	387	5	18	5	18	8	27	4	16	12	43	2	6	12	46	19	69	9	34	20	72	11	38
March.....	April 3.....	5	97	438	5	20	5	24	8	36	5	21	10	50	2	9	12	57	18	80	8	33	14	63	10	45
April.....	May 1.....	4	93	333	5	19	5	19	6	22	3	10	10	39	2	6	11	40	17	60	8	28	17	59	9	31
May.....	May 29.....	4	103	319	6	17	7	23	7	23	2	7	11	32	1	2	11	40	21	68	11	29	19	56	7	22
June.....	July 3.....	5	97	432	6	26	7	32	7	34	1	5	10	41	2	8	10	47	19	83	10	43	20	88	5	25
July.....	July 21.....	4	99	351	5	16	7	25	7	25	1	4	11	39	3	10	12	46	18	64	10	33	18	61	7	25
August.....	August 28....	4	93	336	5	16	7	25	6	24	1	4	10	39	2	8	12	45	18	64	8	26	17	60	7	25
September.....	October 2....	5	85	392	1	4	5	24	6	28	2	8	10	46	3	14	11	53	17	81	8	36	15	66	7	32
October.....	October 30....	4	94	345	4	16	6	22	6	22	2	7	9	32	2	7	11	43	19	69	10	36	18	65	7	26
November.....	November 27..	4	89	322	5	17	6	22	5	18	2	6	8	28	1	4	12	47	17	61	8	28	18	66	7	25
December.....	January 1....	5	83	386	4	16	6	28	6	28	1	5	6	28	2	8	11	53	16	76	8	34	16	77	7	33

*The counties in each division are given in Exhibit I. +From some of the observers reports were not received every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks in the given month or in the year.

+In some localities there were more observers than one. The whole number of localities from which reports were received was 147; the average number per month was 88. The names of observers and number of cards received from each observer for each month and for the year are stated in Exhibit V.

EXHIBIT IV.—*Stating, for each of thirteen years, 1885-1897, the number of Reports received, and on what Per Cent of these reports each of 28 Diseases was stated to be present: also an Average for the period of Twenty Years, 1877-1896, and an Average for the period of Eleven Years, 1886-1896.* The diseases are arranged in the order of greatest area of prevalence in 1897. (Continued for each month of 1896 and 1897 on the two pages following.)*

Line Number.	Diseases.	What Per Cent of the Reports stated the Presence of the Disease.															
		Av. 1877-96.	Av. 1886-96.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	
	Av. Disease†.....	26	22	18	18	20	20	20	21	25	25	23	24	25	26	26	
1	Rheumatism.....	67	65	66	60	60	62	64	64	69	71	65	66	69	70	68	
2	Neuralgia.....	63	61	58	54	56	56	57	61	66	67	63	62	67	67	68	
3	Bronchitis.....	59	56	50	51	52	50	53	54	60	65	58	59	55	56	56	
4	Influenza.....	41	41	47	44	44	41	43	42	55	53	32	32	33	35	34	
5	Tonsillitis.....	47	46	43	45	43	42	49	48	49	50	46	41	47	49	50	
6	Diarrhea.....	45	43	34	34	42	40	40	43	47	44	45	41	48	45	46	
7	Consumption, pul...	52	43	20	23	29	36	38	38	49	52	48	49	51	55	58	
8	Pneumonia.....	31	25	19	18	21	20	22	25	27	30	26	30	28	27	27	
9	Pleuritis.....		17	18	16	17	18	14	18	21	19	17	18				
10	Inflam. of kidney..	20	19	17	16	20	17	17	21	20	21	20	19	18	20	21	
11	Intermittent fev...	53	35	17	19	22	24	24	27	36	41	43	45	48	54	59	
12	Erysipelas.....	21	18	14	12	13	13	14	16	19	21	22	24	24	23	24	
13	Measles.....	11	8	13	7	4	6	7	4	10	12	6	16	14	6	5	
14	Dysentery.....	17	15	12	11	15	14	13	15	16	16	17	17	19	17	15	
15	Remittent fev.....	36	25	11	16	20	20	18	21	28	27	30	34	32	34	36	
16	Inflam. of bowels..	14	14	10	10	11	13	12	13	15	14	14	14	16	17	17	
17	Cholera morbus....	17	15	10	11	15	14	14	15	16	15	14	15	19	17	17	
18	Cholera infantum...	12	11	8	8	12	12	10	11	13	10	11	11	13	14	17	
19	Typhoid fever (ent)	11	10	7	10	13	11	9	9	11	8	10	10	10	8	8	
20	Diphtheria.....	14	7	5	5	5	7	7	7	6	8	6	7	10	13	14	
21	Whooping-cough...	15	11	4	7	9	12	9	10	9	9	16	9	14	20	14	
22	Scarlet fever.....	14	10	4	8	12	14	10	12	9	10	10	9	8	11	12	
23	Puerperal fever....	4	4	2	2	2	2	3	4	3	4	5	4	6	5	6	
24	Inflam. of brain....	5	4	2	3	3	3	3	3	4	5	5	5	6	5	6	
25	Cerebro-spi. men...	3	2	1	1	0.8	1	2	2	3	3	3	3	3	4	6	
26	Typho-mal. fever...	15	9	0.9	2	4	4	4	5	6	7	16	15	16	16	16	
27	Membranous croup	5	3	0.7	1	2	2	2	3	4	4	3	4	4	5	5	
28	Small-pox.....	0.8	0.5	.05	4	0.3	0.6	0.3	.02	0	0.1	.03	.03	.02	0.4	0.2	
No. of reports received		\$4,547	\$4,981	4,418	3,940	4,395	5,572	5,853	5,281	4,291	4,939	5,000	5,047	4,896	5,583	5,108	

* For 1897 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III.; the names of the observers and the number of the reports received from each are stated in Exhibit V.

† The numbers opposite the names of the diseases do not state what per cent of the whole number of reports for the year stated the disease to be present at some time during the year, but state (on an average for twelve months of the year), what per cent of reports for the several months stated the disease to be present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the reports for that month (the number of which is stated at the foot of the column) stated the given disease to be present in that month. ‡ An average for the period 1888-96. § Average per year.

EXHIBIT IV.—CONTINUED.—*Stating for each of 28 Diseases by months, on what Per 1896 and 1897; also the Average by Months for the Period of eleven*

What Per Cent of the Reports Received Stated Presence of the Disease.

Line number.	January.*					February.*					March.*						
	Diseases.				Av. '77-90†	Diseases.				Av. '77-90†	Diseases.				Av. '77-90†		
	Av. '86-96.	1897.	1896.	Average Disease†		Av. '86-96.	1897.	1896.	Average Disease†		Av. '86-96.	1897.	1896.	Average Disease†			
	27	23	18	19		27	24	18	19		27	24	19	20			
1	Rheumatism	70	68	67	62	Influenza	66	69	72	78	Influenza	63	67	75	79		
2	Influenza	62	65	63	70	Bronchitis	73	69	66	60	Neuralgia	71	70	66	64		
3	Bronchitis	72	68	59	59	Rheumatism	70	69	65	63	Rheumatism	72	71	65	62		
4	Neuralgia	67	66	59	65	Neuralgia	69	68	58	62	Bronchitis	72	69	63	59		
5	Tonsillitis	58	57	57	57	Tonsillitis	58	57	53	52	Tonsillitis	58	57	50	49		
6	Pneumonia	51	43	31	23	Pneumonia	54	45	35	30	Pneumonia	52	43	34	39		
7	Consumption, pul.	54	45	23	22	Pleuritis	54	44	22	21	Pleuritis	52	43	25	27		
8	Pleuritis	51	43	31	23	Consumption, pul.	55	44	20	24	Consumption, pul.	56	46	23	23		
9	Inflam. of kidney.	21	20	15	12	Diarrhea	27	27	19	23	Diarrhea	29	29	19	19		
10	Diarrhea	27	27	14	24	Erysipelas	22	21	15	15	Inflam. of kidney	23	22	17	18		
11	Erysipelas	23	20	13	14	Inflam. of kidney.	22	21	14	24	Measles	15	13	17	11		
12	Intermittent fev.	43	39	12	14	Intermittent fev.	43	38	12	13	Erysipelas	24	23	16	15		
13	Remittent fever.	30	22	10	21	Measles	12	11	12	7	Intermittent fev.	46	31	10	13		
14	Diphtheria	16	9	6	5	Remittent fever.	29	21	15	15	Remittent fever.	31	21	9	15		
15	Measles	9	7	8	2	Inflam. of bowels.	12	11	7	7	Inflam. of bowels.	13	13	7	12		
16	Inflam. of bowels.	12	12	6	7	Diphtheria	16	7	6	5	Dysentery	7	6	6	3		
17	Scarlet fever.	18	13	4	16	Typhoid fev. (ent.)	7	5	5	10	Diphtheria	13	6	5	2		
18	Dysentery	7	6	4	4	Scarlet fever.	17	11	5	10	Puerperal fever.	5	4	4	1		
19	Typhoid fev. (ent.)	9	7	3	10	Dysentery	6	6	4	4	Cholera morbus.	4	3	3	2		
20	Puerperal fever.	5	5	3	3	Cholera morbus.	4	3	3	2	Typhoid fev. (ent.)	5	4	3	3		
21	Whooping-cough.	15	10	8	8	Puerperal fever.	5	4	2	2	Inflam. of brain.	5	5	2	2		
22	Inflam. of brain.	4	4	2	2	Whooping-cough.	15	11	9	9	Whooping-cough.	15	11	9	9		
23	Membran. croup.	3	3	3	3	Inflam. of brain.	5	5	2	5	Cerebro-spl. men.	4	3	2	1		
24	Cerebro-spl. men.	3	2	10	5	Cerebro-spl. men.	4	3	1	1	Membran. Croup.	6	4	10	3		
25	Cholera morbus.	4	3	1	3	Membran. croup.	7	5	0.5	0.7	Scarlet fever.	18	12	1	11		
26	Cholera infantum.	0	0	0	1	Cholera infantum	1	1	0.3	1	Typho-mal. fever.	9	5	0.7	0.7		
27	Typho-mal. fever.	11	6	0	0.8	Typho-mal. fever.	10	5	0.3	0.3	Cholera infantum	2	1	0.2	0.7		
28	Small-pox.	1	0.4	0	0	Small-pox.	1	0.7	0	2	Small-pox.	0	0.5	0	0.3		
Reports received§		381	412	377	370	Reports received§		347	382	387	305	Reports received§		364	395	438	298
Line number.	April.*					May.*					June.*						
	Diseases.				Av. '77-90†	Diseases.				Av. '77-90†	Diseases.				Av. '77-90†		
	Av. '86-96.	1897.	1896.	Average Disease†		Av. '86-96.	1897.	1896.	Average Disease†		Av. '86-96.	1897.	1896.	Average Disease†			
	27	23	18	17		25	22	17	16		24	20	16	16			
1	Neuralgia	70	68	66	57	Rheumatism	70	70	66	61	Rheumatism	66	65	68	55		
2	Influenza	55	57	65	55	Neuralgia	64	63	61	50	Neuralgia	61	59	54	50		
3	Rheumatism	74	72	65	67	Bronchitis	59	57	46	45	Bronchitis	57	47	46	39		
4	Bronchitis	69	66	60	56	Tonsillitis	47	46	45	37	Tonsillitis	39	37	34	32		
5	Tonsillitis	53	53	46	44	Influenza	39	40	45	30	Influenza	27	25	29	22		
6	Pneumonia	45	37	27	26	Measles	22	18	32	17	Diarrhea	42	39	27	37		
7	Pleuritis	42	22	24	19	Diarrhea	33	31	24	23	Measles	18	15	25	14		
8	Measles	19	15	24	10	Pneumonia	33	27	24	21	Consumption, pul.	53	42	22	24		
9	Consumption, pul.	57	47	21	21	Consumption, pul.	55	45	22	26	Inflam. of kidney.	21	20	19	14		
10	Diarrhea	30	29	20	19	Pleuritis	55	48	19	19	Intermittent fev.	57	37	18	23		
11	Erysipelas	25	23	17	13	Inflam. of kidney.	23	23	17	17	Erysipelas	21	19	13	13		
12	Inflam. of kidney.	24	23	17	19	Erysipelas	23	21	16	13	Pleuritis	21	14	13	15		
13	Intermittent fev.	53	36	14	21	Intermittent fev.	56	36	13	23	Remittent fever.	36	24	13	15		
14	Remittent fever.	33	22	11	10	Remittent fever.	34	23	11	14	Inflam. of bowels.	14	14	11	12		
15	Inflam. of bowels.	12	12	8	9	Inflam. of bowels.	13	13	10	10	Pneumonia	20	15	10	13		
16	Diphtheria	13	6	5	1	Dysentery	8	7	6	5	Cholera morbus.	16	15	6	16		
17	Scarlet fever.	17	13	5	9	Diphtheria	11	6	5	3	Dysentery	12	10	6	11		
18	Dysentery	7	6	4	4	Whooping-cough.	15	12	5	7	Cholera infantum.	9	9	5	9		
19	Cholera morbus.	5	4	4	3	Scarlet fever.	15	11	3	5	Typhoid fev. (ent.)	5	5	5	6		
20	Whooping-cough.	14	12	3	8	Cerebro-spl. men.	4	3	3	1	Scarlet fever.	13	10	5	5		
21	Cerebro-spl. men.	4	2	2	0	Typhoid fev. (ent.)	4	4	3	3	Whooping-cough.	15	12	4	11		
22	Puerperal fever.	5	5	2	3	Puerperal fever.	5	4	3	4	Puerperal fever.	5	4	3	2		
23	Inflam. of brain.	6	5	1	3	Cholera morbus.	7	7	3	7	Diphtheria	19	6	3	3		
24	Typhoid fev. (ent.)	5	3	0.9	3	Cholera infantum	3	3	3	4	Inflam. of brain.	5	4	3	3		
25	Membran. croup.	5	4	0.6	0	Inflam. of brain.	5	4	2	4	Cerebro-spl. men.	3	2	2	2		
26	Small-pox.	0.9	0.2	0.6	1	Membran. croup.	4	3	0.9	1	Typho-mal. fever.	8	4	0.7	0.6		
27	Cholera infantum	2	1	0.3	1	Typho-mal. fever.	8	5	0.9	1	Membran. croup.	3	2	0.5	0		
28	Typho-mal. fever.	8	5	0.3	0.4	Small-pox.	1.3	0.1	0	0	Small-pox.	1.1	0.2	0	0		
Reports received§		31	339	333	277	Reports received§		371	407	319	298	Reports received§		377	408	432	313

* , † , ‡. These notes are on the preceding page.

§ The numbers in this line.

Cent of the Reports Received the Diseases were stated to be Present in each of the years
years, 1886-96, and for the Period of twenty years, 1877-96.

What Per Cent of the Reports Received Stated Presence of the Disease.*

July.*					August.*					September.*					Line number.
Diseases.					Diseases.					Diseases.					
	AV. 77-96.	AV. 86-96.	1897.	1896.		AV. 77-96.	AV. 86-96.	1897.	1896.		AV. 77-96.	AV. 86-96.	1897.	1896.	
Average disease.	25	22	17	17	Average disease.	28	24	18	18	Average disease.	28	24	19	18	
Rheumatism.....	60	60	67	54	Diarrhea.....	82	78	63	65	Rheumatism.....	60	60	67	54	
Neuralgia.....	57	56	53	44	Rheumatism.....	57	57	60	52	Diarrhea.....	77	73	66	59	
Diarrhea.....	68	63	46	56	Neuralgia.....	55	54	53	43	Neuralgia.....	57	55	53	45	
Bronchitis.....	41	40	35	36	Bronchitis.....	40	38	40	35	Bronchitis.....	46	45	41	46	
Tonsillitis.....	33	33	30	33	Tonsillitis.....	32	31	38	30	Influenza.....	26	24	33	27	
Consumption, pul.	51	41	23	22	Cholera morbus.....	51	47	27	36	Dysentery.....	44	40	30	24	
Inflam. of kidney.....	18	17	23	13	Dysentery.....	48	42	24	33	Tonsillitis.....	36	35	30	40	
Influenza.....	19	17	21	18	Influenza.....	19	17	24	16	Cholera morbus.....	37	35	28	21	
Cholera morbus.....	40	34	20	27	Intermittent fev.....	60	41	24	23	Intermittent fev.....	59	39	28	23	
Intermittent fev.....	60	40	17	24	Cholera infantum.....	43	39	22	29	Cholera infantum.....	34	32	27	18	
Inflam. of bowels.....	16	15	16	13	Consumption, pul.....	50	41	22	25	Consumption, pul.....	50	40	18	25	
Cholera infantum.....	28	25	16	20	Inflam. of kidney.....	17	16	18	11	Remittent fever.....	46	32	16	20	
Remittent fever.....	38	26	16	17	Inflam. of bowels.....	19	19	15	15	Inflam. of kidney.....	16	15	15	13	
Dysentery.....	27	22	16	21	Remittent fever.....	44	31	15	22	Inflam. of bowels.....	18	16	14	8	
Measles.....	11	8	12	9	Erysipelas.....	16	14	12	11	Pleuritis.....	11	11	13	14	
Erysipelas.....	18	16	12	11	Typhoid fev. (ent.).....	14	14	12	16	Erysipelas.....	15	14	11	12	
Pleuritis.....	11	11	11	11	Pleuritis.....	11	11	11	6	Typhoid fev. (ent.).....	20	19	10	24	
Whooping-cough.....	15	14	9	8	Measles.....	15	13	9	8	Pneumonia.....	14	11	6	7	
Diphtheria.....	10	9	5	5	Whooping-cough.....	17	13	8	4	Whooping-cough.....	16	12	5	5	
Inflam. of brain.....	19	14	4	4	Typho-mal fever.....	18	12	4	4	Measles.....	10	10	4	4	
Typhoid fev. (ent.).....	10	10	4	4	Pneumonia.....	11	10	4	7	Scarlet fever.....	10	6	4	6	
Scarlet fever.....	10	7	4	6	Puerperal fever.....	4	3	3	3	Cerebro-spi. men.....	3	2	3	2	
Pneumonia.....	13	10	3	10	Inflam. of brain.....	5	4	3	2	Inflam. of brain.....	5	4	2	1	
Typho-mal fever.....	11	6	3	2	Scarlet fever.....	9	6	3	5	Typho-mal fever.....	28	16	5	5	
Puerperal fever.....	4	3	2	2	Diphtheria.....	11	6	2	3	Puerperal fever.....	4	3	2	1	
Cerebro-spi. men.....	3	2	0.3	2	Cerebro-spi. men.....	3	2	0.3	2	Diphtheria.....	11	7	1	6	
Membran. croup.....	0.2	0.1	0	0	Membran. croup.....	2	1	0	0	Membran. croup.....	3	2	0.5	1	
Small-pox.....	0.2	0.2	0	0	Small-pox.....	0.4	0.1	0	0	Small-pox.....	0.2	0.1	0	0	
Reports received.	400	439	351	374	Reports received.	418	463	336	300	Reports received.	395	438	392	377	

October.*					November.*					December.*					Line number.
Diseases.					Diseases.					Diseases.					
	AV. 77-96.	AV. 86-96.	1897.	1896.		AV. 77-96.	AV. 86-96.	1897.	1896.		AV. 77-96.	AV. 86-96.	1897.	1896.	
Average disease.	27	22	19	17	Average disease.	25	21	17	17	Average disease.	26	22	16	17	
Rheumatism.....	65	65	66	60	Rheumatism.....	69	66	68	65	Rheumatism.....	70	68	66	63	
Diarrhea.....	53	50	58	36	Neuralgia.....	64	62	59	59	Neuralgia.....	65	63	61	57	
Neuralgia.....	61	59	56	56	Bronchitis.....	63	59	47	59	Bronchitis.....	67	63	53	61	
Bronchitis.....	54	53	43	53	Tonsillitis.....	53	52	46	56	Influenza.....	52	55	53	58	
Tonsillitis.....	44	44	38	47	Influenza.....	42	41	40	49	Tonsillitis.....	58	57	46	58	
Influenza.....	32	31	34	39	Diarrhea.....	33	30	34	23	Diarrhea.....	26	25	22	15	
Dysentery.....	23	21	29	13	Inflam. of kidney.....	19	19	19	15	Pneumonia.....	37	31	20	20	
Intermittent fev.....	57	38	24	22	Intermittent fev.....	51	33	19	17	Pleuritis.....	42	19	17	17	
Cholera morbus.....	14	12	21	6	Pneumonia.....	28	23	17	18	Inflam. of kidney.....	19	19	18	15	
Cholera infantum.....	12	11	17	4	Pleuritis.....	17	16	16	13	Erysipelas.....	22	20	14	13	
Inflam. of kidney.....	18	17	17	14	Consumption, pul.....	50	40	14	22	Consumption, pul.....	51	41	13	21	
Consumption, pul.....	51	40	16	22	Erysipelas.....	20	17	14	9	Intermittent fev.....	44	28	12	15	
Pleuritis.....	13	13	15	11	Typhoid fev. (ent.).....	19	16	12	11	Inflam. of bowels.....	13	12	9	10	
Typhoid fev. (ent.).....	10	10	14	17	Remittent fever.....	37	27	10	15	Measles.....	6	5	9	4	
Remittent fever.....	44	32	13	17	Dysentery.....	10	9	9	3	Scarlet fever.....	15	12	6	12	
Inflam. of bowels.....	14	13	13	10	Inflam. of bowels.....	12	11	7	7	Typhoid fev. (ent.).....	13	11	7	4	
Erysipelas.....	18	16	13	10	Measles.....	5	5	7	3	Dysentery.....	6	5	7	3	
Pneumonia.....	18	15	10	12	Diphtheria.....	19	11	6	12	Diphtheria.....	18	10	6	9	
Diphtheria.....	15	9	6	10	Scarlet fever.....	14	11	6	6	Remittent fever.....	32	23	5	14	
Whooping-cough.....	15	9	5	5	Cholera morbus.....	14	9	5	5	Whooping-cough.....	14	9	3	2	
Scarlet fever.....	15	11	4	12	Whooping-cough.....	14	9	5	5	Inflam. of brain.....	14	9	4	2	
Measles.....	15	11	4	12	Cholera infantum.....	14	9	5	5	Cholera morbus.....	4	4	1	2	
Inflam. of brain.....	15	11	4	12	Puerperal fever.....	4	3	2	3	Cerebro-spi. men.....	3	2	1	2	
Puerperal fever.....	4	3	2	3	Inflam. of brain.....	4	3	2	3	Membran. croup.....	7	5	1	2	
Cerebro-spi. men.....	3	2	0.6	1	Cerebro-spi. men.....	4	3	2	3	Puerperal fever.....	4	4	1	2	
Membran. croup.....	4	3	0.6	1	Membran. croup.....	4	4	0.9	2	Typho-mal fever.....	14	7	0.8	1	
Typho-mal fever.....	29	17	0	6	Typho-mal fever.....	21	11	0	2	Cholera infantum.....	2	2	0.3	1	
Small-pox.....	0.3	0.2	0	0	Small-pox.....	0.5	0.2	0	0	Small-pox.....	0.5	0.2	0	0	
Reports received.	409	448	345	326	Reports received.	387	432	322	312	Reports received.	358	418	356	330	

state how many reports received for the month in the given years.

EXHIBIT V.—By Months and by Geographical Divisions of the State,* the Names of 167 Observers, whose Weekly Reports of Diseases for 1897 are Compiled in Tables 1, 2, 3 and 4, the Localities^a for which they Report, and the Number of Reports Received from each Observer.

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1897.—Compiled in this Article.												
	Year, 1897.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All localities.....	4,418	377	387	438	333	319	432	351	336	392	345	322	386
Upper Peninsula Division.....	198	13	18	20	19	17	26	16	16	4	16	17	16
Bessemer, <i>Geo. L. Loope, M. D.</i>	9					4	5						
Iron River, <i>Robert H. Sturgeon, M. D.</i>	34				4	4	5	4	4		4	4	5
Ironwood, <i>J. K. Niven, M. D.</i>	40	2	4	5	4	3	4	3	4		4	3	4
Laurium, <i>D. K. McQueen, M. D.</i>	37	4	4	3	4			4	3	4	4	4	3
Rockland Tp., <i>W. C. Gates, M. D.</i>	26	4	4	5	4	2	5	2					
Sault Ste. Marie, <i>H. R. Floyd, M. D.</i>	13	3	4	3	3								
Sault Ste. Marie, <i>B. D. Harrison, M. D.</i>	18					2	4	3	2		4	3	4
St. Ignace, <i>J. F. Darby, M. D.</i>	21		2	4		2	3		3			3	4
Northwestern Division.....	281	19	18	24	19	23	32	25	25	24	22	22	28
Bear Lake, <i>Chas. W. Tomlin, M. D.</i>	33					2	5	4	4	5	4	4	5
Cadillac, <i>David Ralston, M. D.</i>	36	3	2	5	3	4	4	3	3		3	2	4
Fife Lake, <i>Lewis S. Walter, M. D.</i>	51	4	4	5	4	4	5	4	4	5	3	4	5
Manistee, <i>James A. King, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Manton, <i>V. F. Huntley, M. D.</i>	51	4	4	4	4	4	5	4	4	5	4	4	5
South Frankfort, <i>D. W. Roos, M. D.</i>	10						4	2	2				
Thompsonville, <i>Richard McDermott, M. D.</i>	31					3	4	4	4	4	4	4	4
Traverse City, <i>J. B. Martin, M. D.</i>	17	4	4	5	4								
Northern Division.....	315	28	27	36	22	23	34	25	24	28	22	18	28
Bellaire, <i>E. R. Close, M. D.</i>	13	3	3	4	3								
Boardman, <i>S. E. Nehardt, M. D.</i>	32	3	2	5	4	3	4	2		3	4	2	
Boyer City, <i>A. J. DeLacey, M. D.</i>	47	4	4	5	4	3	5	4	4	5			5
Central Lake, <i>A. W. Foy, M. D.</i>	12	3	4	5									
Cheboygan, <i>Thos. W. S. Albin, M. D.</i>	17					4	5	4	4				
Cheboygan, <i>S. A. St. Amour, M. D.</i>	13	4	2	4	3								
East Jordan, <i>F. C. Warne, M. D.</i>	27	3	4	4	4	4	5						
Harbor Springs, <i>E. A. Runyan, M. D.</i>	23						3	4	5	2	4	3	
Kalkaska, <i>P. W. Pearsall, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Mancelona, <i>Chas. Beaver, M. D.</i>	12	4	4	4									
Mancelona, <i>C. A. Johnson, M. D.</i>	33					2	5	4	4	5	4	4	5
Petoskey, <i>O. L. Ramsdell, M. D.</i>	34					3	5	4	4	5	4	4	5
Northeastern Division.....	105	12	16	21	10	7	5	4	4	8	7	6	5
Alpena, <i>A. M. Miller, M. D.</i>	12	4	4	4									
East Tawas, <i>H. A. Goodale, M. D.</i>	17			4	2	3				3	3	2	
Harrisville, <i>D. W. Mitchell, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Rogers City, <i>C. W. Isaminger, M. D.</i>	7		4	3									
Tawas City, <i>Geo. S. Darling, M. D.</i>	17	4	4	5	4								
Northern Central Division.....	90	8	6	9	6	2	8	10	8	14	7	4	8
Beaverton, <i>Frank S. Pierce, M. D.</i>	22						3	4	4	5	3		3
Big Rapids, <i>W. A. Whitney, M. D.</i>	17	4	4	5	4								
Gladwin, <i>C. G. Suyland, M. D.</i>	6							2		4			
Rosecommon, <i>Clifford C. Curnalia, M. D.</i>	12	4	2	4	2								
Shepherd, <i>W. J. Galerno, M. D.</i>	33					2	5	4	4	5	4	4	5
Western Division.....	464	47	43	50	39	32	41	39	39	46	32	28	28
Cannonsburg, <i>C. R. Crosby, M. D.</i>	34	4	4	5	4		3	3		5	4	2	
Carnovia, <i>C. E. Koon, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Custer, <i>Austin D. Kibbie, M. D.</i>	38	4	4	5	4	4	3	2	3	5	2	2	
Grand Rapids, <i>A. Hazlewood, M. D.</i>	47	4	3	5	4	2	3	4	4	5	4	4	5
Grandville, <i>John D. Buskirk, M. D.</i>	51	4	4	5	4	4	5	4	4	5	4	4	4
Hart, <i>J. A. Fleming, M. D.</i>	33					2	5	4	4	5	4	4	5
Lowell, <i>O. C. McDannell, M. D.</i>	23	4				2	4	4	3	2			
Ludington, <i>E. N. Dundas, M. D.</i>	17	4	4	5	4								
Ludington, <i>E. Nelson Heysett, M. D.</i>	34					4	5	4	4	5	4	4	4
Luther, <i>H. W. Hammond, M. D.</i>	5	2	3										
Luther, <i>Elijah Treadgold, M. D.</i>	11							4	4	3			
Muskegon, <i>Geo. S. Williams, M. D.</i>	19	4	4	5	4	2							
Rockford, <i>W. L. Curtiss, M. D.</i>	14	2	2	5	3	2							

* The counties in each division are shown in Exhibit I.

^a In many cases the reports include sickness in the vicinity as well as the corporate limits of the places named.

EXHIBIT V.—CONTINUED.

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1897.—Compiled in this Article.												
	Year, 1897.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Western Division.— Con.													
Rockford, <i>Hollis O. Sarber, M. D.</i>	26	---	---	---	---	---	---	4	4	5	4	4	5
Sand Lake, <i>A. R. Hicks, M. D.</i>	13	---	---	---	---	2	5	2	4	---	---	---	---
Scottville, <i>W. C. Martin, M. D.</i>	16	3	4	5	4	---	---	---	---	---	---	---	---
White Cloud, <i>W. A. Kuhn, M. D.</i>	24	4	4	5	4	4	3	---	---	---	---	---	---
Whitehall, <i>John Busby, M. D.</i>	7	4	3	---	---	---	---	---	---	---	---	---	---
Central Division.	848	73	69	80	60	68	83	64	64	81	69	61	76
Alma, <i>J. F. Suydam, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Bancroft, <i>Geo. Cosgrove, M. D.</i>	28	---	4	5	---	3	3	5	2	4	2	---	5
Brighton, <i>H. M. Ptolmey, M. D.</i>	34	4	3	3	3	4	5	2	2	---	4	4	---
Charlotte, <i>W. E. Newark, M. D.</i>	10	---	---	---	3	3	4	---	---	---	---	---	---
Durand, <i>A. G. Cowles, M. D.</i>	19	4	4	5	4	2	---	---	---	---	---	---	---
Elsie, <i>A. B. Way, M. D.</i>	7	3	4	---	---	---	---	---	---	---	---	---	---
Flint, <i>Noah Bates, M. D.</i>	30	3	---	---	---	---	3	4	4	4	4	4	4
Flushing, <i>Chas. S. Wheeler, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Gaines, <i>G. H. Alway, M. D.</i>	51	4	4	5	4	4	5	4	4	5	3	4	5
Greenville, <i>C. O. Jenison, M. D.</i>	6	---	---	3	3	---	---	---	---	---	---	---	---
Hamburg Tp., <i>J. N. Swartz, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Hastings, <i>G. W. Lowry, M. D.</i>	43	4	4	5	4	4	5	3	4	5	3	2	---
Howard City, <i>James Totten, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Ionia, <i>Lester Joslin, M. D.</i>	32	---	---	---	---	2	5	4	3	5	4	4	5
Lakeview, <i>F. R. Blanchard, M. D.</i>	13	4	---	5	2	2	---	---	---	---	---	---	---
Laings, <i>A. D. Hagadorn, M. D.</i>	16	4	3	5	4	---	---	---	---	---	---	---	---
Leslie, <i>Martin S. Dowling, M. D.</i>	21	---	---	---	---	3	4	4	2	---	3	2	3
Lyons, <i>David C. Spalding, M. D.</i>	33	---	---	---	---	2	5	4	4	5	4	4	5
Maple Rapids, <i>A. O. Hart, M. D.</i>	8	---	---	---	---	---	3	2	3	---	---	---	---
Mason, <i>Chas. G. Jenkins, M. D.</i>	37	3	3	4	4	4	3	4	4	5	3	---	---
McBride, <i>D. C. Bell, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Middleville, <i>Geo. W. Matteson, M. D.</i>	11	4	4	3	---	---	---	---	---	---	---	---	---
Nashville, <i>W. H. Young, M. D.</i>	13	4	4	5	---	---	---	---	---	---	---	---	---
Perry, <i>H. P. Halstead, M. D.</i>	43	4	3	---	4	4	4	4	4	4	4	3	5
Pottersville, <i>E. R. Espe, M. D.</i>	22	4	---	---	---	---	---	---	---	5	4	4	5
Putnam Tp., <i>C. L. Sigler, M. D.</i>	9	---	---	4	3	---	---	---	---	---	---	2	---
Stanton, <i>Roy Lighton Bentley, M. D.</i>	31	---	---	---	---	2	4	3	4	5	4	4	5
Stanton, <i>W. P. Gamber, M. D.</i>	11	4	4	3	---	---	---	---	---	---	---	---	---
St. Johns, <i>C. E. Knapp, M. D.</i>	8	---	3	---	---	3	---	2	---	---	---	---	---
Stockbridge, <i>Chris. N. Brogan, M. D.</i>	17	---	2	---	2	2	---	---	---	4	3	---	4
Vermontville, <i>F. H. Snell, M. D.</i>	35	---	---	---	---	4	5	4	4	5	4	4	5
Bay and Eastern Division.	559	42	46	57	40	40	47	46	45	53	43	47	53
Almont, <i>David H. Burley, M. D.</i>	26	---	---	---	---	---	3	4	3	5	3	4	4
Bay City, <i>F. A. Ruggles, M. D.</i>	6	---	---	---	---	---	---	3	3	---	---	---	---
Chesaning, <i>D. W. Mudge, M. D.</i>	13	4	4	5	---	---	---	---	---	---	---	---	---
Chesaning, <i>G. R. Hinman, M. D.</i>	5	---	---	---	2	3	---	---	---	---	---	---	---
Columbiaville, <i>E. Conley, M. D.</i>	51	3	4	5	4	4	5	4	4	5	4	4	5
Croswell, <i>T. S. Kingston, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Deckerville, <i>H. F. Alderton, M. D.</i>	50	4	4	5	4	4	5	4	4	3	4	4	5
Emmett, <i>A. J. Abbott, M. D.</i>	10	4	3	---	---	3	---	---	---	---	---	---	---
Forestville, <i>A. Stephens, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Fremont Tp. (Tuscola Co.), <i>Benj. D'Arcy, M. D.</i>	44	---	---	5	4	4	5	4	4	5	4	4	5
Lapeer, <i>J. V. Frazier, M. D.</i>	47	---	4	5	4	3	5	4	4	5	4	4	5
Lexington, <i>L. T. Schurmer, M. D.</i>	31	---	---	---	---	---	5	4	4	5	4	4	5
Marine City, <i>F. Blagborne, M. D.</i>	20	4	4	5	4	3	---	---	---	---	---	---	---
Marlette, <i>F. E. Wilson, M. D.</i>	15	4	4	5	2	---	---	---	---	---	---	---	---
Sebewaing, <i>Norman J. Pike, M. D.</i>	13	4	3	3	---	---	---	---	---	---	---	3	---
Thornville, <i>J. S. Coulkins, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Vassar, <i>F. D. LeValley, M. D.</i>	25	---	---	---	---	---	3	4	3	5	4	4	5
West Bay City, <i>F. L. Tupper, M. D.</i>	47	3	4	4	4	4	4	4	3	5	4	4	4
Southwestern Division.	396	36	34	33	28	29	43	33	26	36	36	28	34
Allegan, <i>Wm. J. Albright, M. D.</i>	18	---	---	---	---	2	5	4	---	---	3	---	4
Benton Harbor, <i>H. V. Tutton, M. D.</i>	17	3	---	3	3	2	4	2	---	---	---	---	---
Berrien Springs, <i>Wm. F. Bullard, M. D.</i>	11	4	4	3	---	---	---	---	---	---	---	---	---
Berrien Springs, <i>Welcome F. Mason, M. D.</i>	12	---	---	---	---	---	---	3	3	3	3	---	---
Buchanan, <i>H. M. Broderick, M. D.</i>	43	3	4	5	4	3	4	2	3	5	4	3	3
Douglas, <i>H. A. Stroud, M. D.</i>	45	3	3	---	4	4	5	4	4	5	4	4	5
Eau Claire, <i>J. H. Herring, M. D.</i>	20	4	4	5	4	3	---	---	---	---	---	---	---
Fennville, <i>W. H. Andrews, M. D.</i>	29	---	---	---	2	2	3	2	3	5	4	3	5
Gallen, <i>Wm. H. Beach, M. D.</i>	2	---	---	---	---	---	3	---	---	---	4	3	---
Hartford, <i>H. C. Maynard, M. D.</i>	19	4	4	5	4	2	---	---	---	---	---	---	---
Hartford, <i>E. A. Palmer, M. D.</i>	17	---	---	---	---	---	5	4	2	4	2	---	---

* The counties in each division are shown in Exhibit I.

EXHIBIT V.—CONCLUDED.

Divisions and localities represented and physicians who reported. (Health Officers in Italics.)	Weekly Reports in 1897. Compiled in this Article.												
	Year, 1897.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Southwestern Division.—Con.													
Otsego, <i>Milton Chase, M. D.</i>	32	—	—	—	—	2	5	4	4	4	4	4	5
Saugatuck, <i>H. H. Stinson, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Vandalia, <i>Phillip D. Greene, M. D.</i>	14	4	4	3	3	—	—	—	—	—	—	—	—
Vandalia, <i>C. H. Fox, M. D.</i>	9	—	—	—	—	3	—	—	—	—	—	3	3
Watervliet, <i>W. L. Garratt, M. D.</i>	40	4	4	4	—	—	4	4	3	5	4	4	4
Wayland, <i>Ed. O. Hanlon, M. D.</i>	6	3	3	—	—	—	—	—	—	—	—	—	—
Southern Central Division.	805	69	72	63	59	56	88	64	60	66	65	66	77
Albion, <i>A. G. Bruce, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Augusta, <i>Chas. E. Doyle, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Blissfield, <i>R. M. Eccles, M. D.</i>	8	—	4	2	—	—	—	—	—	—	—	—	—
Bronson, <i>S. M. Cornell, M. D.</i>	43	—	—	4	4	4	5	4	4	5	4	4	5
Brooklyn, <i>Fred. W. Palmer, M. D.</i>	21	—	—	—	—	—	3	3	3	4	3	3	5
Burr Oak Tp., <i>J. C. Rollman, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Burr Oak, <i>C. D. Parsons, M. D.</i>	7	4	3	—	—	—	—	—	—	—	—	—	—
Burr Oak, <i>Geo. Crofford, M. D.</i>	17	—	—	—	—	2	5	4	4	—	2	—	—
Clayton, <i>E. J. C. Ellis, M. D.</i>	28	2	3	—	2	2	3	2	3	3	3	3	5
Clinton, <i>John E. White, M. D.</i>	27	—	—	—	—	2	5	2	2	5	3	3	5
Concord, <i>W. N. Keeler, M. D.</i>	15	4	4	5	2	—	—	—	—	—	—	—	—
Concord, <i>F. S. Tuthill, M. D.</i>	31	—	—	—	—	2	5	4	3	4	4	4	5
Constantine, <i>D. E. Thomas, M. D.</i>	44	4	4	—	2	4	5	4	4	5	4	4	4
Galesburg, <i>O. F. Burroughs, M. D.</i>	6	3	3	—	—	—	—	—	—	—	—	—	—
Galesburg, <i>Wm. A. Burdick, M. D.</i>	32	—	—	—	—	2	5	4	4	4	4	4	5
Homer, <i>C. A. Colburn, M. D.</i>	13	2	—	—	4	4	3	—	—	—	—	—	—
Hudson, <i>Geo. W. Rice, M. D.</i>	17	4	4	5	4	4	—	—	—	—	—	—	—
Kalamazoo, <i>A. H. Rockwell, M. D.</i>	26	—	2	3	4	4	5	4	—	—	2	2	—
Litchfield, <i>Amos Atkinson, M. D.</i>	13	4	4	5	—	—	—	—	—	—	—	—	—
Manchester, <i>C. F. Kapp, M. D.</i>	21	4	4	—	—	—	—	—	—	—	4	4	5
Marshall, <i>E. J. Marshall, M. D.</i>	8	4	4	—	—	—	—	—	—	—	—	—	—
Marshall, <i>F. M. Foote, M. D.</i>	29	—	—	—	—	2	5	2	4	3	4	4	5
Mendon, <i>G. W. Nihart, M. D.</i>	16	4	4	4	4	—	—	—	—	—	—	—	—
Mendon, <i>Wm. A. Royer, M. D.</i>	32	—	—	—	—	2	4	4	4	5	4	4	5
Sturgis, <i>S. B. Follett, M. D.</i>	11	2	4	5	—	—	—	—	—	—	—	—	—
Sturgis, <i>David V. Runyan, M. D.</i>	7	—	—	—	—	—	4	—	—	—	—	3	—
Tecumseh, <i>J. F. Jenkins, M. D.</i>	49	4	4	5	4	3	4	4	4	5	4	4	4
Tecumseh, <i>F. O. Tefft, M. D.</i>	21	—	3	4	4	4	3	3	—	—	—	—	—
Three Rivers, <i>W. M. Ikeler, M. D.</i>	7	—	—	3	4	—	—	—	—	—	—	—	—
Union City, <i>Mark T. Clay, M. D.</i>	7	—	—	—	—	2	3	2	—	—	—	—	—
White Pigeon, <i>W. C. Cameron, M. D.</i>	46	4	4	4	4	3	4	4	3	4	3	4	5
Ypsilanti, <i>Clark R. Willcoxon, M. D.</i>	16	4	4	5	3	—	—	—	—	—	—	—	—
Ypsilanti, <i>Edward Batwell, M. D.</i>	31	—	—	—	—	2	4	4	4	5	4	4	4
Southeastern Division.	357	30	38	45	31	22	25	25	25	32	26	25	33
Highland Park, <i>A. Stewart, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Memphis, <i>D. H. Cole, M. D.</i>	13	4	4	5	—	—	—	—	—	—	—	—	—
Memphis, <i>Edmond D. Mills, M. D.</i>	36	—	—	—	3	2	5	4	4	5	4	4	5
Mt. Clemens, <i>Edward G. Folsam, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Petersburg, <i>Frank B. Jones, M. D.</i>	10	4	3	3	—	—	—	—	—	—	—	—	—
Plymouth, <i>F. N. Dewey, M. D.</i>	27	—	4	5	2	2	—	2	2	3	2	2	3
Pontiac, <i>Mason W. Gray, M. D.</i>	15	—	2	5	4	4	—	—	—	—	—	—	—
Richmond, <i>Frank T. Fenton, M. D.</i>	52	4	4	5	4	4	5	4	4	5	4	4	5
Romeo, <i>Wm. Greenshields, M. D.</i>	38	—	4	4	4	—	—	4	4	5	4	4	5
Utica, <i>Geo. G. Roberson, M. D.</i>	12	3	3	3	3	—	—	—	—	—	—	—	—
Warren, <i>J. C. Flynn, M. D.</i>	16	4	4	5	3	—	—	—	—	—	—	—	—
Wyandotte, <i>N. T. Langlois, M. D.</i>	34	3	2	—	—	2	5	3	3	4	4	3	5

* The counties in each division are shown in Exhibit I.

TABLE 1.—*Stating for each of Thirteen Years, 1885-1897, the number and Per Cent of Observers by whom the following Diseases were reported present; also an Average for the period of Twenty Years, 1877-1896, and an Average for the period of Eleven Years, 1886-1896.* The Diseases are arranged in order of greatest Number of Observers who reported them present in 1897. (Continued for each month of 1896 and 1897 on the two pages following.)*

Line number.	Diseases.	Observers by whom the Several Diseases were Reported Present— Average Per Cents (per Month) of those making reports.†															
		Av. 1877- 96.‡	Av. 1886- 96.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	
	Av. for tabulated dis- eases reported pres.	37	33	27	21	30	30	31	33	37	37	36	35	37	37	38	
1	Rheumatism.....	82	82	81	78	78	78	80	83	86	87	82	82	82	85	83	
2	Neuralgia.....	80	79	74	74	74	74	76	80	83	85	82	79	83	83	83	
3	Bronchitis.....	74	72	66	70	69	67	72	73	75	81	75	74	69	71	70	
4	Tonsilitis.....	70	69	64	70	66	64	71	71	74	75	71	64	68	70	72	
5	Influenza.....	55	55	61	59	58	55	57	56	69	67	49	46	46	48	47	
6	Diarrhea.....	63	62	53	55	60	58	61	63	67	68	65	60	65	64	66	
7	Pneumonia.....	49	43	36	34	36	36	37	43	40	50	47	49	46	48	44	
8	Pleuritis.....	32	30	32	32	28	27	35	36	35	33	32					
9	Inflam. of kidney.....	34	33	30	29	33	31	29	36	36	36	35	33	32	35	34	
10	Intermittent fever.....	65	50	27	31	35	36	37	43	52	58	61	59	64	71	73	
11	Erysipelas.....	39	36	27	26	28	27	29	34	39	43	43	44	44	43	44	
12	Consumption, pul.....	61	51	25	29	35	43	47	49	60	62	59	57	60	64	68	
13	Dysentery.....	31	29	24	23	28	27	25	29	30	31	33	30	33	30	28	
14	Inflam. of bowels.....	28	28	24	23	25	27	25	28	31	29	29	30	32	32	32	
15	Measles.....	17	15	22	12	8	11	14	7	17	22	12	25	22	10	9	
16	Cholera morbus.....	30	28	21	23	26	27	26	29	31	29	27	29	33	29	33	
17	Remittent fever.....	50	38	20	27	32	31	28	34	43	40	45	49	46	48	52	
18	Cholera infantum.....	22	21	14	15	22	20	18	21	23	21	21	20	24	25	21	
19	Typhoid fever (ent.).....	18	16	11	16	21	18	15	15	16	14	17	16	15	15	16	
20	Diphtheria.....	25	14	10	10	10	13	13	15	13	16	12	14	18	24	27	
21	Scarlet fever.....	24	18	8	14	19	24	19	22	17	18	18	17	15	20	22	
22	Whooping-cough.....	23	18	7	12	14	18	15	18	16	17	25	16	24	28	21	
23	Puerperal fever.....	11	10	7	6	7	6	9	11	8	9	13	12	14	12	13	
24	Inflam. of brain.....	11	11	6	7	8	9	8	9	11	12	13	13	15	13	14	
25	Cerebro-spi. men.....	7	6	3	4	2	4	5	5	6	8	7	7	7	8	12	
26	Membranous croup.....	11	8	3	2	4	5	5	8	10	11	7	10	10	12	10	
27	Typho-mal. fever.....	24	16	2	6	8	8	9	10	12	14	26	25	26	27	27	
28	Small-pox.....	1	0.4	.09	1	0.5	1	0.3	.08	0	0.2	.5	.07	.01	0.5	0.4	
	No. of Observers.....	149	166	167	144	185	189	205	199	145	155	139	142	155	169	163	
	Av. No. of Observers } per month..... }	92	103	95	82	94	116	113	109	91	102	100	102	114	113	104	

* For 1897 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III; the names of the observers and the number of the reports received from each are stated in Exhibit V.

†, ‡. Foot-notes are on page 105.

TABLE 1.—CONTINUED.—*Per Cent of Observers by whom the several Diseases were the period of eleven years, 1886-96, and*

Per Cent of Observers by whom the Diseases were Reported Present.															
Line number.	January.*					February.*					March.*				
	Diseases.	Av. '77-96†	Av. '86-96.	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96.	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96.	1897.	1896.
	Averaget.....	38	35	26	29	Averaget.....	37	33	26	28	Averaget.....	38	35	28	27
1	Rheumatism.....	86	84	82	82	Influenza.....	76	79	86	89	Influenza.....	76	81	88	87
2	Tonsillitis.....	80	80	77	85	Rneumatism.....	84	83	79	78	Rheumatism.....	85	84	81	80
3	Influenza.....	73	76	76	74	Bronchitis.....	84	82	78	73	Neuralgia.....	86	85	81	80
4	Neuralgia.....	83	82	75	78	Neuralgia.....	83	83	75	77	Bronchitis.....	85	82	76	75
5	Bronchitis.....	84	81	74	77	Tonsillitis.....	77	76	74	71	Tonsillitis.....	79	78	76	72
6	Pneumonia.....	73	66	55	42	Pneumonia.....	74	67	56	49	Pneumonia.....	72	65	61	61
7	Pleuritis.....	43	43	38	37	Pleuritis.....	41	41	35	36	Pleuritis.....	42	42	43	43
8	Diarrhea.....	47	47	31	50	Diarrhea.....	44	45	34	39	Diarrhea.....	45	48	42	36
9	Consumption, pul.	63	54	27	31	Erysipelas.....	42	39	30	28	Measles.....	24	22	31	17
10	Inflam. of kidney.....	35	34	26	38	Consumption, pul.	62	53	25	29	Consumption, pul.	64	54	29	25
11	Erysipelas.....	43	39	25	31	Inflam. of kidney.....	37	36	23	36	Erysipelas.....	43	41	28	25
12	Intermittent fev.....	57	42	20	21	Intermittent fev.....	56	41	22	17	Inflam. of kidney.....	38	37	26	27
13	Remittent fever.....	43	33	18	29	Inflam. of bowels.....	24	23	20	17	Intermittent fev.....	59	43	21	20
14	Diphtheria.....	30	18	16	9	Measles.....	19	17	17	13	Inflam. of bowels.....	27	26	20	23
15	Inflam. of bowels.....	25	25	15	22	Remittent fever.....	46	31	16	28	Dysentery.....	14	13	14	5
16	Measles.....	16	13	14	5	Diphtheria.....	26	15	14	11	Remittent fever.....	42	32	14	23
17	Dysentery.....	15	15	11	15	Dysentery.....	12	12	11	13	Diphtheria.....	24	13	11	5
18	Scarlet fever.....	31	24	10	24	Scarlet fever.....	23	19	9	16	Puerperal fever.....	13	11	9	6
19	Membran. roup.....	12	12	6	5	Typhoid fev. (ent.).....	12	9	8	18	Cholera morbus.....	11	9	8	6
20	Puerperal fever.....	12	11	6	6	Puerperal fever.....	11	10	7	6	Typhoid fev. (ent.).....	9	6	8	5
21	Whooping-cough.....	23	18	6	17	Cholera morbus.....	9	7	6	5	Inflam. of brain.....	11	12	7	5
22	Typhoid fev. (ent.).....	16	12	5	17	Inflam. of brain.....	12	12	4	10	Whooping-cough.....	22	17	6	14
23	Inflam. of brain.....	11	11	4	8	Cerebro-spi. men.....	8	6	3	1	Scarlet fever.....	30	22	5	20
24	Cholera morbus.....	10	9	4	12	Whooping-cough.....	21	17	3	13	Cerebro-spi. men.....	9	8	4	4
25	Cerebro-spi. men.....	6	6	3	1	Membran. roup.....	15	10	2	2	Membran. roup.....	13	9	3	2
26	Cholera infantum.....	29	12	0	0	Cholera infantum.....	4	4	1	4	Typho-mal fever.....	15	5	3	2
27	Typho-mal fever.....	29	12	0	0	Typho-mal fever.....	17	9	1	1	Cholera infantum.....	4	3	3	2
28	Small-pox.....	2	0	5	0	Small-pox.....	1	0	7	0	Small-pox.....	1	1	6	4
	Observers §.....	89	98	102	78	Observers §.....	89	99	107	83	Observers §.....	87	96	97	83
Line number.	Aprl.*					May.*					June.*				
	Diseases.	Av. '77-96†	Av. '86-96.	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96.	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96.	1897.	1896.
	Averaget.....	38	34	26	27	Averaget.....	37	34	25	25	Averaget.....	35	32	28	26
1	Rheumatism.....	87	86	85	83	Rheumatism.....	85	85	78	79	Rheumatism.....	83	81	86	75
2	Influenza.....	68	72	84	78	Neuralgia.....	81	80	75	62	Neuralgia.....	78	76	71	70
3	Neuralgia.....	85	83	77	75	Tonsillitis.....	71	71	62	60	Bronchitis.....	68	67	67	60
4	Bronchitis.....	82	81	72	75	Bronchitis.....	77	75	59	65	Tonsillitis.....	63	62	57	54
5	Tonsillitis.....	75	76	61	73	Influenza.....	56	58	57	46	Diarrhea.....	64	63	53	63
6	Pneumonia.....	67	60	45	46	Measles.....	33	29	41	25	Influenza.....	40	39	46	37
7	Pleuritis.....	40	40	34	33	Diarrhea.....	54	52	40	42	Measles.....	28	24	41	22
8	Measles.....	29	25	38	16	Pneumonia.....	56	49	38	22	Inflam. of kidney.....	35	34	38	22
9	Diarrhea.....	49	49	35	40	Pleuritis.....	34	30	32	32	Intermittent fev.....	69	52	35	36
10	Erysipelas.....	44	41	31	24	Erysipelas.....	44	42	28	30	Inflam. of bowels.....	29	29	33	28
11	Intermittent fev.....	65	49	24	33	Consumption, pul.	65	55	26	31	Consumption, pul.	60	52	32	30
12	Consumption, pul.	65	57	23	31	Inflam. of kidney.....	39	39	22	28	Erysipelas.....	40	38	28	28
13	Inflam. of kidney.....	38	38	23	35	Intermittent fev.....	69	52	21	37	Pneumonia.....	37	30	28	24
14	Remittent fever.....	46	34	17	22	Inflam. of bowels.....	28	28	20	19	Remittent fever.....	49	37	25	22
15	Inflam. of bowels.....	25	25	16	22	Remittent fever.....	48	35	15	25	Pleuritis.....	42	29	25	31
16	Dysentery.....	14	13	12	11	Dysentery.....	17	17	13	14	Dysentery.....	23	21	18	23
17	Cholera morbus.....	12	10	11	10	Diphtheria.....	21	13	10	6	Cholera infantum.....	21	19	15	17
18	Diphtheria.....	23	12	10	3	Whooping-cough.....	24	20	9	11	Cholera morbus.....	35	31	14	32
19	Scarlet fever.....	28	21	9	14	Puerperal fever.....	11	11	8	10	Scarlet fever.....	22	17	12	10
20	Cerebro-spi. men.....	9	6	6	0	Cholera morbus.....	18	17	7	17	Inflam. of brain.....	12	11	11	8
21	Puerperal fever.....	11	12	5	6	Typhoid fev. (ent.).....	8	7	7	6	Puerperal fever.....	11	10	9	6
22	Whooping-cough.....	22	19	5	14	Scarlet fever.....	26	20	7	9	Typhoid fev. (ent.).....	10	9	8	11
23	Inflam. of brain.....	13	11	3	6	Inflam. of brain.....	12	11	5	10	Whooping-cough.....	24	20	7	20
24	Cholera infantum.....	4	4	1	3	Cerebro-spi. men.....	9	7	5	5	Cerebro-spi. men.....	7	5	6	5
25	Membran. roup.....	12	9	1	0	Cholera infantum.....	9	10	5	14	Diphtheria.....	19	12	6	6
26	Typhoid fev. (ent.).....	8	6	1	3	Membran. roup.....	9	7	3	4	Typho-mal fever.....	16	9	3	2
27	Typho-mal fever.....	15	11	1	2	Typho-mal fever.....	15	10	3	4	Membran. roup.....	6	4	2	0
28	Small-pox.....	2	0	5	1	Small-pox.....	2	0	4	0	Small-pox.....	2	0	5	0
	Observers §.....	81	89	93	63	Observers §.....	89	98	103	81	Observers §.....	93	105	97	87

*, †. These notes are on the preceding page.

§ The numbers in this line

Reported Present by Months in each of the years 1896-97, and the Average by Months for the Period of twenty years, 1877-96.

Per Cent of Observers by whom the Diseases were Reported Present.															
July.*					August.*					September.*					Line number.
Diseases.	Av. '77-96†	Av. '86-96	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96	1897.	1896.	
Averaget.....	38	35	26	31	Averaget.....	40	37	28	29	Averaget.....	41	36	32	32	
Rheumatism.....	79	79	79	74	Diarrhea.....	94	92	77	88	Diarrhea.....	91	88	87	83	1
Neuralgia.....	77	77	69	71	Rheumatism.....	75	76	75	71	Rheumatism.....	77	78	87	78	2
Diarrhea.....	87	84	64	79	Neuralgia.....	74	75	72	70	Neuralgia.....	75	75	75	72	3
Bronchitis.....	59	59	54	55	Tonsillitis.....	56	57	58	53	Bronchitis.....	63	64	66	73	4
Tonsillitis.....	58	59	48	65	Bronchitis.....	57	58	57	57	Dysentery.....	67	63	58	46	5
Cholera morbus.....	65	59	41	59	Cholera morbus.....	73	70	48	59	Cholera morbus.....	62	58	55	43	6
Inflam. of kidney.....	33	32	35	29	Dysentery.....	70	66	43	58	Tonsillitis.....	59	58	54	72	7
Influenza.....	31	30	34	28	Cholera infantum.....	64	61	39	47	Influenza.....	40	38	32	44	8
Inflam. of bowels.....	33	33	33	35	Influenza.....	32	30	37	27	Cholera infantum.....	56	53	45	35	9
Cholera infantum.....	47	45	29	48	Intermittent fev.....	72	57	34	34	Intermittent fev.....	72	56	41	46	10
Dysentery.....	47	44	29	46	Inflam. of bowels.....	37	38	32	30	Inflam. of bowels.....	32	32	35	23	11
Consumption, pul.....	59	50	28	26	Inflam. of kidney.....	29	29	28	22	Remittent fever.....	59	46	32	32	12
Intermittent fev.....	72	57	25	45	Consumption, pul.....	58	50	26	33	Pleuritis.....	57	43	32	35	13
Remittent fever.....	54	42	25	31	Remittent fever.....	58	45	25	33	Inflam. of kidney.....	27	27	33	27	14
Measles.....	20	16	24	19	Erysipelas.....	33	31	24	24	Erysipelas.....	31	30	25	27	15
Erysipelas.....	37	34	23	29	Pleuritis.....	23	19	16	16	Consumption, pul.....	57	48	24	37	16
Pleuritis.....	22	24	20	28	Typhoid fev. (ent.).....	23	24	18	27	Typhoid fev. (ent.).....	31	30	21	36	17
Whooping-cough.....	26	22	16	15	Measles.....	10	8	12	6	Pneumonia.....	26	32	19	19	18
Diphtheria.....	19	10	10	6	Pneumonia.....	22	19	12	17	Inflam. of brain.....	11	9	7	5	19
Pneumonia.....	27	31	7	24	Puerperal fever.....	9	7	10	5	Typho-mal. fever.....	41	27	7	16	20
Scarlet fever.....	19	13	7	11	Whooping-cough.....	26	22	10	8	Measles.....	7	5	7	4	21
Inflam. of brain.....	12	12	6	9	Scarlet fever.....	17	13	6	8	Scarlet fever.....	18	14	7	9	22
Typhoid fev. (ent.).....	14	15	6	23	Inflam. of brain.....	13	12	5	5	Whooping-cough.....	24	20	7	14	23
Typho-mal. fever.....	20	14	4	8	Typho-mal. fever.....	31	25	5	12	Cerebro-spi. men.....	8	6	6	6	24
Puerperal fever.....	10	9	4	5	Diphtheria.....	20	12	4	5	Puerperal fever.....	9	8	6	5	25
Cerebro-spi. men.....	7	6	1	4	Cerebro-spi. men.....	7	6	1	7	Diphtheria.....	22	14	5	14	26
Membran. croup.....	4	3	1	0	Membran. croup.....	4	3	0	0	Membran. croup.....	6	4	2	2	27
Small-pox.....	1	0	3	0	Small-pox.....	0	0	3	0	Small pox.....	0	6	0	3	28
Observers §.....	96	108	99	80	Observers §.....	99	111	93	83	Observers §.....	98	111	85	81	
October.*					November.*					December.*					Line number.
Diseases.	Av. '77-96†	Av. '86-96	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96	1897.	1896.	Diseases.	Av. '77-96†	Av. '86-96	1897.	1896.	
Averaget.....	40	35	28	27	Averaget.....	37	33	25	26	Averaget.....	37	33	26	28	
Rheumatism.....	83	83	78	76	Rheumatism.....	83	82	79	82	Rheumatism.....	85	83	80	80	1
Diarrhea.....	77	75	74	61	Neuralgia.....	81	80	74	77	Neuralgia.....	82	80	72	79	2
Neuralgia.....	79	79	67	78	Tonsillitis.....	75	74	69	76	Tonsillitis.....	79	78	71	84	3
Tonsillitis.....	69	70	59	72	Bronchitis.....	77	75	65	74	Bronchitis.....	81	78	71	80	4
Bronchitis.....	76	71	56	72	Diarrhea.....	54	52	53	42	Influenza.....	67	71	67	78	5
Dysentery.....	44	41	52	29	Influenza.....	57	58	53	64	Diarrhea.....	46	46	48	41	6
Influenza.....	47	47	49	57	Pneumonia.....	49	43	38	36	Pneumonia.....	59	52	43	42	7
Cholera morbus.....	31	29	40	15	Inflam. of kidney.....	32	31	34	28	Inflam. of kidney.....	33	32	39	36	8
Intermittent fev.....	70	54	39	31	Intermittent fev.....	64	47	28	25	Pleuritis.....	37	33	37	37	9
Inflam. of kidney.....	33	32	32	27	Erysipelas.....	37	35	25	22	Erysipelas.....	40	38	31	28	10
Cholera infantum.....	25	24	29	11	Pleuritis.....	31	25	25	35	Inflam. of bowels.....	27	26	25	24	11
Inflam. of bowels.....	29	28	28	24	Dysentery.....	21	20	24	9	Intermittent fev.....	58	42	22	29	12
Remittent fever.....	58	46	28	28	Remittent fever.....	51	40	19	25	Consumption, pul.....	60	49	19	24	13
Pleuritis.....	22	28	28	25	Typhoid fev. (ent.).....	28	25	19	16	Measles.....	11	9	17	6	14
Pneumonia.....	36	32	27	28	Consumption, pul.....	58	48	18	28	Dysentery.....	14	13	16	10	15
Erysipelas.....	36	33	22	19	Cholera morbus.....	14	13	15	9	Scarlet fever.....	27	23	14	24	16
Typhoid fev. (ent.).....	34	32	32	25	Inflam. of bowels.....	25	23	13	15	Remittent fever.....	47	36	13	22	17
Consumption, pul.....	60	48	19	26	Diphtheria.....	31	18	11	17	Typhoid fev. (ent.).....	20	16	13	9	18
Diphtheria.....	29	18	10	15	Measles.....	9	7	11	9	Diphtheria.....	30	18	12	17	19
Inflam. of brain.....	10	9	9	1	Cholera infantum.....	9	7	8	5	Inflam. of brain.....	11	11	7	12	20
Scarlet fever.....	22	18	6	7	Scarlet fever.....	23	19	8	11	Cholera morbus.....	11	10	6	6	21
Whooping-cough.....	20	15	6	7	Puerperal fever.....	10	9	7	1	Whooping-cough.....	20	15	6	6	22
Measles.....	6	5	5	2	Whooping-cough.....	21	16	6	5	Membran. croup.....	16	12	5	5	23
Puerperal fever.....	10	9	5	8	Inflam. of brain.....	10	9	4	8	Puerperal fever.....	10	9	5	7	24
Cerebro-spi. men.....	7	5	1	2	Membran. croup.....	15	10	3	3	Typho-mal. fever.....	23	13	2	2	25
Membran. croup.....	11	9	1	4	Cerebro-spi. men.....	6	4	1	3	Cerebro-spi. men.....	6	5	1	7	26
Typho-mal. fever.....	43	28	0	10	Typho-mal. fever.....	31	18	0	7	Cholera infantum.....	5	5	1	2	27
Small-pox.....	0	0	4	0	Small-pox.....	0	0	5	0	Small-pox.....	1	0	4	0	28
Observers §.....	97	108	94	89	Observers §.....	95	107	89	88	Observers §.....	93	103	83	86	

state how many observers reported for the month in the given years.

TABLE 2.—WEEKLY REPORTS OF DISEASES IN MICHIGAN IN 1897.—Exhibiting for the Year and for each Month of the Year ending January 1, 1898, a Summary relative to diseases in the State of Michigan; also for each month a Summary relative to diseases in each of 11 Geographical Divisions* of the State.—Indicating the prevalence as regards Time and Area. Compiled from 4,418 Weekly Reports by 167 Observers, Health Officers of Cities and Villages, Regular Correspondents of the State Board of Health, and other Physicians, Reporting the Diseases under their observation.

Number of Observers, Reports, etc.	Diseases.	(A, b) Per Cent of Observers report- ing presence of.	Average Per Cent of Weeks Reported Present Where	Per Cent of Reports Stating Presence of	Average Order of Prevalence Where Present	Average Order of Prevalence where present.													
						1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	A. V. 1877-1886- 1896. [†]	A. V. 1886- 1896.
Ending January 1, 1898. [†] localities represented, 147. Observers during the year, 167. Reports compiled, 4,418. ^a reports per month, 368.	Average for tabulated dis- eases reported present.	27	64	18	2.7	2.7	3.0	3.0	3.3	3.1	3.3	3.3	3.3	3.5	3.7	3.7	3.8	3.8	3.3
	Brain, inflammation of....	6	36	2	3.4	4.1	4.0	4.8	4.3	3.9	4.9	5.4	4.8	6.4	6.2	5.9	6.0	5.7	5.0
	Bowels, inflammation of..	24	41	10	3.3	3.5	3.6	3.8	4.0	4.1	4.3	4.4	4.1	4.6	5.0	5.0	5.1	4.9	4.2
	Bronchitis.....	66	75	50	2.6	2.4	2.6	2.6	2.5	2.6	2.7	2.6	2.7	2.7	3.0	3.0	3.1	3.0	2.7
	Cerebro-spinal meningitis.	3	42	1	3.4	3.6	3.7	3.9	4.4	3.7	5.3	4.7	4.2	4.6	7.8	7.3	6.9	5.8	4.8
	Cholera infantum.....	14	52	8	2.9	2.9	3.0	3.3	3.4	3.6	3.6	3.5	3.4	4.0	4.1	3.9	4.6	4.2	3.5
	Cholera morbus.....	21	48	10	3.0	2.9	3.0	3.3	3.3	3.4	3.4	3.5	3.4	3.7	3.8	4.2	4.5	4.2	3.4
	Consumption, pulmonary.	25	81	20	3.1	3.0	3.5	3.4	3.5	3.7	3.8	3.5	3.5	3.6	3.7	3.9	4.0	4.2	3.6
	Croup, membranous.....	3	30	0.7	2.9	3.9	4.6	4.5	4.1	4.7	4.4	4.6	4.3	5.1	6.8	6.2	6.1	5.8	4.8
	Diphtheria.....	10	49	5	2.9	3.7	4.4	3.5	3.4	3.5	4.4	4.2	4.3	4.8	4.4	4.2	4.7	4.6	4.1
	Diarrhea.....	53	63	34	2.5	2.5	2.5	2.5	2.6	2.6	2.7	2.9	2.8	3.0	3.0	3.2	3.3	3.2	2.8
	Dysentery.....	24	48	12	3.2	3.0	3.2	3.3	3.6	3.8	3.8	3.8	3.7	3.8	4.3	4.5	5.0	4.5	3.7
	Erysipelas.....	27	51	14	3.4	3.5	3.7	3.8	3.9	4.1	4.2	4.1	4.1	4.4	4.7	4.5	4.6	4.9	4.1
	Fever, intermittent.....	27	60	17	2.7	2.7	2.9	2.9	2.9	3.0	3.2	2.9	2.6	2.6	2.8	2.6	2.4	2.6	2.8
	Fever, remittent.....	20	54	11	3.2	2.9	3.1	3.1	2.9	2.9	3.3	3.2	3.2	3.1	3.4	3.3	3.2	3.2	3.1
	Fever, typhoid (enteric).	11	58	7	3.3	3.3	3.4	3.6	3.2	3.6	3.5	3.8	3.9	4.2	4.5	4.7	4.7	4.7	3.8
	Fever, typho-malarial....	2	37	0.9	2.7	2.8	3.2	3.7	3.6	3.7	3.6	3.6	3.6	3.9	4.2	4.4	4.4	4.4	3.6

For the Year	Whole number of Average number of Whole number of	61	75	47	1.8	2.0	2.2	2.0	2.1	2.2	2.4	2.7	3.0	2.7	2.9	2.7	2.3
Influenza.....	30	56	17	3.4	3.5	3.6	3.7	3.6	3.9	4.1	4.1	4.5	4.9	4.7	4.4	4.0
Kidney, inflammation of.....	22	62	13	2.3	2.7	3.1	2.8	3.3	3.0	3.5	3.2	3.6	5.0	6.4	4.0	3.3
Measles.....	74	79	58	2.4	2.3	2.5	2.5	2.5	2.8	2.7	2.6	2.7	2.8	2.8	3.1	2.6
Neuralgia.....	30	57	18	3.6	3.4	3.8	3.8	3.8	4.0	4.1	4.2	4.0	4.4	.....	.....	3.9*
Pleuritis.....	36	50	19	3.4	3.2	3.7	3.7	3.6	3.7	4.0	3.9	3.7	4.0	4.3	4.0	3.8
Puerperal fever.....	7	36	2	3.1	3.2	3.5	3.9	3.8	4.1	4.5	4.5	3.4	4.6	5.7	6.3	4.3
Rheumatism.....	81	81	66	2.3	2.3	2.7	2.6	2.6	2.7	2.9	2.9	3.0	3.2	3.2	3.2	2.8
Scarlet fever.....	8	49	4	3.0	3.1	3.5	3.3	3.6	3.2	4.2	4.2	3.9	4.6	5.0	4.6	3.9
Small-pox.....09	100	.05	2.0	6.3	2.8	4.1	4.8	5.0	0	6.5	11.0	15.3	26.0	25.9	9.8
Tonsillitis.....	64	67	43	2.6	2.6	3.0	3.0	2.8	2.9	3.3	3.4	3.4	3.4	3.4	3.5	3.1
Whooping-cough.....	7	61	4	2.1	2.4	2.6	2.9	3.0	3.0	2.9	3.2	3.3	3.9	4.2	3.7	3.2

* The Counties in each division, are shown in Exhibit I.

† The number of observers, reports, weeks in each month, etc., are shown in Exhibit III.; the names of observers, and number of reports received from each, are shown in Exhibit V.

‡ This note on the following page.

a. Not every one of the observers sent in a report for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks.

b. The numbers in this column (pages 102-105) state not what per cent of the whole number of observers for the year reported the disease present at some time during the year, but the average (for the twelve months) of the per cents (of observers making reports for the several months) by which the disease was reported present in those months. The column for the year is thus a statement for an average month. But on pages 104 and 105 the numbers in the "Per Cent of Observers" column are statements for the month, and not averages. This column indicates the Area of Prevalence except that in a few instances there were two or more observers in one city or village.

c. This is a statement for the year or given month, what per cent the number of reports which stated a disease to be present is of the number of card-reports received, for the given time, from such of the observers as reported the diseases present. It is therefore an "average, not for all localities represented, but only for those at which the given disease was reported present." In this line Average for "Unabated Diseases." It states what per cent the number of times all diseases were reported present is of the number of times they might have been so reported on the cards received, for the time specified, from the observers who during that time reported the diseases present (that is, if each of the observers had on every card he sent reported every disease present which he reported present at all). It will be seen that this is a more accurate average than would be obtained by dividing the sum of the column by the number of diseases reported present.

d. This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from all observers in the State or Division, as the case may be. It combines, and states, in a general way, an idea of the time a disease was prevalent, with an idea of the area of its prevalence. Had every observer sent a report every week of the month or year, the numbers in this column would be (for the State) the product of the numbers in the same line in the two preceding columns.

e. The disease having the greatest number of cases was to be marked 1 in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals (for the State) of the Order of Prevalence column, in Table 3 (a table giving statements for each locality, omitted in printing this report, for want of room) by the number of observers who reported the disease present. The column is therefore an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of observers who reported the different diseases present, thus counting each observer once for every disease he reported present. As a rule, small numbers in this column indicate a large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer from week to week, the greater will be the "average" in this column.

TABLE 2.—CONTINUED.—*Diseases in the State, 1897. (Foot-notes and full tabular heads are on the two preceding pages.)*

[illegible]

A. v. for Tab. Dis. Rep. Pres...	25	64	17	2.6	23	65	18	2.7	32	60	19	2.7	October +	23	65	19	2.8	November +	25	65	17	2.7	December +	26	62	16	2.6
Brain, inflammation of.....	6	64	4	3.2	5	47	3	2.8	7	31	2	3.8	9	34	3	3.1	4	33	4	36	2	4.3	7	33	2	9	4.3
Bowels, inflammation of.....	33	49	16	3.3	32	47	15	3.4	35	40	14	3.3	23	46	13	3.6	13	23	13	51	7	3.5	25	36	2	9	3.1
Bronchitis.....	54	65	35	2.9	57	69	40	3.0	66	63	41	2.8	56	76	43	2.9	65	71	65	71	4	2.5	71	74	53	2	2.3
Cerebro-spinal meningitis.....	1	25	0.3	3.0	1	25	0.3	4.0	6	43	3	3.6	3	50	0.6	3.0	1	50	1	75	0.9	4.0	1	80	1	4.0	4.0
Cholera infantum.....	29	54	16	2.7	39	58	22	2.5	45	63	27	3.0	23	60	17	3.1	8	31	8	31	2	3.6	1	20	0.3	2.0	2.0
Cholera morbus.....	41	49	20	2.7	48	57	27	2.8	55	52	28	2.9	40	52	21	3.0	15	35	15	35	5	3.2	6	20	1	1.6	1.6
Consumption, pulmonary.....	28	84	23	2.5	26	86	22	3.2	24	74	18	3.1	19	83	16	2.9	18	82	18	82	14	2.9	19	73	13	3.1	3.1
Croup, membranous.....	1	25	0.3	2.0	0	0	0	0	2	25	0.5	3.0	1	50	0.6	3.0	3	27	3	27	0.9	4.3	15	21	1	2.3	2.3
Diphtheria.....	10	50	5	3.0	4	40	2	2.5	5	21	3.0	1.0	10	91	6	3.4	11	61	11	61	6	3.4	12	49	6	2.0	2.0
Diarrhea.....	64	72	46	1.9	77	80	63	1.9	87	77	66	1.8	74	78	58	2.0	53	63	53	63	34	2.8	48	45	22	2.8	2.8
Dysentery.....	23	53	16	3.2	43	56	24	3.2	58	53	30	2.8	52	57	29	3.0	24	41	24	41	9	3.2	16	45	7	3.5	3.5
Erysipelas.....	29	48	12	2.5	24	49	12	2.5	32	44	11	3.1	22	58	13	3.4	25	54	25	54	14	2.9	31	45	14	3.4	3.4
Fever, intermittent.....	25	63	17	2.2	34	68	24	2.1	41	70	28	2.3	33	60	24	2.7	28	64	28	64	19	2.8	22	58	12	2.3	2.3
Fever, remittent.....	25	61	16	2.8	25	57	15	3.0	32	48	16	2.9	28	47	13	2.9	19	52	19	52	10	3.2	13	39	5	3.3	3.3
Fever, typhoid (enteric).....	6	70	4	3.3	18	64	12	3.2	21	49	10	3.1	22	63	14	2.8	19	64	19	64	12	3.3	13	54	7	3.2	3.2
Fever, typho-malarial.....	4	38	2	2.8	5	72	4	3.0	7	31	2	3.0	0	0	0	0	0	0	0	0	0	0	2	38	0.8	2.0	2.0
Influenza.....	34	62	21	2.5	37	64	24	2.6	52	62	33	2.2	49	69	34	2.3	53	75	53	75	40	1.9	67	76	53	1.8	1.8
Kidney, inflammation of.....	35	62	23	2.9	38	60	18	3.1	52	48	15	3.5	32	50	17	3.5	34	57	34	57	19	3.4	39	45	18	3.2	3.2
Measles.....	24	54	12	2.7	12	67	8	2.3	7	56	4	3.0	5	65	3	2.2	11	54	11	54	7	2.7	17	54	9	2.6	2.6
Neuralgia.....	69	77	53	2.2	72	74	53	2.3	75	71	53	2.4	67	84	56	2.4	74	79	74	79	59	2.2	72	85	61	2.3	2.3
Pleuritis.....	20	51	11	2.8	19	55	11	3.0	28	46	13	3.3	28	55	15	3.0	35	63	35	63	18	3.3	33	56	19	3.1	3.1
Pneumonia.....	7	41	3	2.9	12	33	4	3.5	19	31	6	3.6	27	38	10	3.5	38	43	38	43	17	3.5	43	46	20	3.1	3.1
Puerperal fever.....	4	38	2	1.8	10	30	3	2.4	6	35	2	3.6	5	47	2	3.0	7	30	7	30	2	2.8	5	22	1	3.0	3.0
Rheumatism.....	79	85	67	2.1	75	80	60	2.1	87	77	67	2.2	78	84	66	2.3	79	87	79	87	68	2.0	80	82	66	2.2	2.2
Scarlet fever.....	7	54	4	3.9	6	39	3	2.7	7	52	4	2.0	6	50	3	2.5	8	64	8	64	6	2.7	14	57	8	2.9	2.9
Small-pox.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis.....	48	62	30	2.6	58	64	38	2.9	54	56	30	3.2	59	65	38	2.6	69	67	69	46	2.4	71	65	46	2.4	2.4	2.4
Whooping-cough.....	16	59	9	2.1	10	77	8	2.1	7	77	5	1.7	6	65	4	2.3	6	6	6	94	5	1.8	6	55	3	2.0	2.0

[Foot-notes from page 99.]

+ The numbers opposite the names of the diseases do not state what per cent of the whole number of observers for the year reported the disease present at some time during the year, but state (on an average for the 12 months of the year) by what per cent of the observers making reports for the several months, the disease was reported present in those months. The columns for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the observers for that month (the number of whom is stated at the foot of the column) reported the given disease in that month.

+ Consumption, remittent fever, and typho-malarial fever were not printed on the first blanks used in making weekly reports (beginning with the month of September, 1876); neuralgia and tonsillitis were not printed on any blanks prior to October, 1878, and not on all used for several months after that date; inflammation of brain and inflammation of bowels were not printed on any blanks used prior to July, 1879, and not on all used for several months after that date; inflammation of kidney was not printed on any of the cards used prior to October, 1883, and not on all used for several months after that date; pleuritis was not printed on any cards used prior to 1888; hence it is probable that the diseases were not so fully reported at first as were the other diseases.

A.v. for Tab. Dis. Rep. Pres.	20	19	16	18	17	17	14	14	12	14	19	19	17	17	15	17	25	23	22	21	15	15	20	28	37	29	34	26	23	35
Brain, inflammation of...	10	12	2	7	7	3	0	0	0	0	0	0	0	0	0	0	3	3	2	0	0	0	14	20	0	0	0	0	0	0
Bowels, inflammation of...	10	12	9	11	8	0	4	12	16	17	11	5	27	28	68	60	20	10	26	0	24	50	43	80	0	25	38	14	17	80
Bronchitis.....	53	53	50	82	78	69	55	26	38	20	38	43	27	28	68	69	69	66	68	75	69	57	100	100	100	75	57	67	100	
Cerebro-spi. meningitis...	4	4	1	0	4	0	0	0	0	0	0	0	0	0	0	2	0.9	1	0	6	0	0	0	0	0	0	0	0	0	0
Cholera infantum.....	7	0	6	0	0	0	0	6	12	25	18	0	0	0	0	8	2	0.9	2	0	0	0	0	0	0	13	14	0	0	0
Cholera morbus.....	8	0	5	0	0	0	0	0	16	17	11	23	0	4	4	8	6	5	8	0	0	10	0	0	0	25	25	0	0	0
Consumption, pulmonary...	31	37	1	4	0	0	5	6	0	0	0	0	0	0	0	38	29	30	42	25	24	0	40	25	100	63	29	17	40	40
Group, membranous.....	2	2	0.3	0	4	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	43	0	0	0	14	0	0
Diphtheria.....	7	5	5	11	0	11	14	17	3	0	0	0	0	0	0	9	10	4	0	0	0	0	0	0	0	0	0	0	0	0
Diarrhea.....	27	21	26	14	11	14	14	9	24	36	46	61	55	44	4	51	45	42	33	19	14	30	57	60	75	100	88	57	33	80
Dysentery.....	15	12	15	0	0	6	0	9	20	29	39	45	17	18	18	15	11	1	0	0	0	14	0	0	0	0	0	0	0	0
Erysipelas.....	23	28	20	14	37	11	45	26	12	4	17	21	18	17	21	26	26	33	42	25	14	40	14	60	25	25	0	57	67	100
Fever, intermittent.....	24	24	3	4	7	6	0	3	0	4	11	0	0	0	0	20	32	1	0	0	0	0	0	0	0	0	13	0	0	0
Fever, remittent.....	11	13	6	4	0	0	0	17	18	8	13	4	5	0	0	9	3	4	0	0	0	0	0	0	0	0	25	29	0	0
Fever, typhoid (enteric)...	8	8	5	0	0	0	0	0	0	17	14	23	11	0	0	2	2	1	0	0	0	0	0	0	0	0	13	0	0	0
Fever, typho-malarial...	6	4	3	0	0	3	0	0	12	17	0	0	0	0	0	6	4	2	0	0	5	0	0	0	0	0	13	0	0	0
Influenza.....	34	34	48	75	85	72	45	26	6	16	46	46	36	50	64	52	58	62	58	38	43	80	57	100	100	63	57	67	100	100
Kidney, inflammation of...	18	20	23	32	30	31	14	22	18	20	13	21	23	28	21	38	37	53	42	25	33	40	57	100	100	100	75	57	67	100
Measles.....	7	4	19	0	0	0	9	22	24	40	46	18	9	33	39	7	61	35	50	44	60	86	40	0	0	0	0	0	0	0
Neuralgia.....	50	46	57	61	56	67	68	65	36	75	64	50	64	68	63	67	67	50	52	60	57	100	100	100	75	71	67	100	60	60
Pleuritis.....	423	11	39	30	25	9	9	0	0	8	0	0	0	6	4	422	43	42	25	29	40	43	80	75	75	50	29	67	60	60
Pneumonia.....	20	19	10	14	7	22	14	13	3	8	4	7	14	6	11	26	23	17	8	0	24	10	43	60	0	0	20	17	40	40
Puerperal fever.....	5	4	6	0	4	11	14	4	3	20	13	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	17	20	0	0
Rheumatism.....	58	56	67	64	67	53	55	74	65	64	86	91	61	71	71	67	62	66	50	50	38	60	100	100	100	75	86	67	100	100
Scarlet fever.....	4	4	3	0	0	0	0	9	3	8	4	0	0	0	7	8	7	6	25	19	0	0	0	0	0	0	0	0	0	0
Small-pox.....	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	.07	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis.....	33	35	42	68	52	53	27	43	26	20	38	39	0	50	68	55	49	49	58	19	24	40	57	100	100	100	25	86	67	60
Whooping-cough.....	8	7	0	0	0	0	0	4	12	12	17	18	11	0	0	7	7	5	0	0	0	43	0	0	0	0	29	0	0	0

*, †, d. See page 103. † Inflammation of kidney was not compiled until 1881. For inflammation of brain and inflammation of bowels, an average for the 17 years, 1880-96; for neuralgia and tonsillitis, an average for the 18 years, 1879-96; pleuritis was not compiled until 1888; for other diseases and for the average line an average for the 20 years, 1877-96. For the Northwestern Division, 1879-96. For the Northern Division, 1882-96. For the Northeastern Division, 1883-96.

Av. for Tab. Dis. Rep. Pres.	28	23	15	14	16	17	18	16	15	15	17	13	15	14	15	Central Division.*												24	22	18	18	19	31	19	16	16	15	17	18	20	17
Brain, inflammation of.....	5	4	2	0	0	0	5	0	4	7	2	0	5	4	0	4	4	3	3	4	2	3	4	3	4	2	3	10	9	3	4	1	2	4							
Bowels, inflammation of.....	18	16	8	0	11	7	20	8	15	13	9	8	2	0	6	13	14	9	5	9	10	3	10	6	13	13	9	6	13	13	9	13	5	9							
Bronchitis.....	63	55	41	45	48	49	60	43	38	28	31	34	33	36	51	54	55	56	63	80	70	60	46	57	39	47	41	52	67	54											
Cerebro-spinal meningitis.....	5	3	2	5	0	0	5	3	2	0	0	6	0	0	0	3	3	2	1	0	0	2	3	4	0	0	6	0	0	5	5	0	5	5							
Cholera infantum.....	16	14	6	0	0	0	5	11	15	18	6	9	4	0	1	10	9	6	0	0	1	2	5	20	21	16	2	0	0	0	0	0	0	0							
Cholera morbus.....	19	16	8	2	2	5	3	3	6	20	24	19	5	0	0	14	14	9	0	0	3	3	1	2	16	19	30	26	8	1				1							
Consumption, pulmonary.....	58	48	15	24	22	16	10	15	11	11	16	11	16	23	9	50	41	28	34	29	46	38	19	24	27	27	23	22	23	20											
Group, membranous.....	7	4	1	0	0	2	5	0	0	0	0	5	0	2	2	3	3	4	1	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0							
Diphtheria.....	20	11	8	19	13	11	0	5	4	4	7	2	9	6	15	13	5	2	4	6	0	5	1	4	3	0	0	0	0	2	3										
Diarrhea.....	45	40	28	7	20	11	13	13	38	50	56	47	35	19	25	43	43	38	16	17	20	22	19	27	42	66	73	74	49	30											
Dysentery.....	17	14	8	2	4	4	3	5	4	15	27	9	14	9	0	14	14	15	5	6	13	3	4	2	6	27	35	49	10	12											
Erysipelas.....	20	15	12	2	7	19	18	23	11	13	11	8	7	15	11	18	18	15	18	17	21	18	21	12	6	13	10	13	18	18											
Fever, intermittent.....	52	29	16	5	7	9	15	15	26	11	27	25	28	13	4	54	37	15	11	13	9	10	9	20	3	23	20	23	21	14											
Fever, remittent.....	33	20	6	2	0	0	5	8	13	11	4	9	9	11	6	38	30	11	7	14	10	2	7	13	17	14	10	16	18	8											
Fever, typhoid (enteric).....	12	14	9	10	13	5	8	5	4	4	11	13	12	11	17	12	12	5	4	1	5	0	4	2	8	17	5	12	7	0											
Fever, typho-malarial.....	21	13	1	0	2	0	3	3	2	0	0	4	0	0	0	13	7	0	0	0	0	0	1	0	2	0	2	0	0	3											
Influenza.....	41	39	48	48	65	75	53	36	22	22	36	44	36	58	8	39	41	45	59	72	76	65	37	28	16	20	30	35	41	62											
Kidney, inflammation of.....	16	14	11	7	9	9	10	8	19	20	13	2	5	21	8	21	21	13	5	1	8	10	18	14	14	13	14	19	26	16											
Measles.....	13	10	8	5	0	21	15	23	2	9	9	2	2	2	6	8	7	17	15	17	25	47	40	40	8	3	0	0	5	5											
Neuralgia.....	64	59	44	38	50	56	0	50	47	37	44	38	44	30	40	64	67	60	68	54	65	62	57	57	55	58	52	55	70	63											
Pleuritis.....	20	21	21	26	28	30	20	13	11	20	8	16	26	28	28	27	23	16	27	49	39	15	9	6	6	5	4	9	11	18											
Pneumonia.....	33	25	20	43	28	26	35	35	15	9	4	4	19	15	19	27	23	16	27	49	39	15	9	6	6	5	4	9	11	18											
Puerperal fever.....	4	3	0	2	14	0	0	0	2	0	2	2	2	6	23	4	3	1	0	0	1	0	3	4	2	0	0	4	3	0											
Rheumatism.....	69	62	51	55	61	61	55	38	55	57	42	45	44	51	43	63	66	69	74	61	70	75	69	66	69	59	67	71	80	72											
Scarlet fever.....	15	11	3	0	0	0	0	0	2	7	2	0	0	0	4	13	9	3	3	1	1	0	6	4	2	2	6	1	5	4											
Small-pox.....	0.8	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0											
Tonsillitis.....	47	42	43	57	46	51	45	53	38	30	42	15	47	47	45	43	44	43	60	62	55	55	40	35	36	33	27	33	51	32											
Whooping-cough.....	19	12	11	7	2	7	15	18	11	17	27	15	5	6	4	13	10	2	3	9	0	0	0	1	8	2	0	0	0	0											

* t. d. See page 103. † Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 17 years, 1880-1896; for neuralgia and tonsillitis, an average for the 18 years, 1879-96; pleuritis was not compiled until 1883; for other diseases, and for the average line, an average for the 20 years, 1877-96; for the Northern Central Division an average for the 17 years, 1880-1896.

TABLE 2.—CONTINUED—Diseases in the Southwestern and Southern Central Divisions of the State, for the Year and by Months in 1897; also an Average for the period of Twenty Years, 1877-1896, and an Average for the period of Eleven Years, 1886-1896.—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Diseases named.*

Diseases.	1877-1896,†	1886-1896.	1897,†	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
A. v. for Tab. Dis. Rep. Pres.	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†	1897,†
Brain, inflammation of.....	4	3	3	3	6	0	3	0	0	2	0	12	3	8	4
Bowels, inflammation of.....	54	53	57	67	74	70	50	59	0	33	54	56	54	56	3
Bronchitis.....	11	12	16	6	9	3	7	21	14	24	23	19	44	21	13
Cerebro-spinal meningitis.....	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cholera infantum.....	18	16	14	0	0	0	0	0	0	9	27	38	50	31	4
Cholera morbus.....	16	17	13	3	0	0	4	0	7	27	42	39	28	11	3
Consumption, pulmonary.....	59	47	20	8	24	27	14	24	28	18	27	14	22	21	52
Croup, membranous.....	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Diphtheria.....	8	4	6	11	6	3	14	3	7	3	6	3	11	11	11
Diarrhea.....	38	38	35	3	26	21	11	17	33	67	88	67	56	35	9
Dysentery.....	15	17	13	0	3	0	4	7	7	24	31	42	31	7	6
Erysipelas.....	23	23	17	14	12	24	18	0	19	21	19	17	25	21	18
Fever, intermittent.....	61	43	36	25	24	24	25	24	37	39	35	56	43	38	58
Fever, remittent.....	42	33	17	32	18	15	25	17	9	15	13	19	14	3	43
Fever, typhoid (enteric.).....	6	6	6	0	0	0	0	0	0	0	23	19	17	14	9
Fever, typho-malarial.....	16	12	0	3	0	0	0	0	0	0	4	0	0	0	13
Influenza.....	46	46	59	72	85	73	57	45	47	42	42	64	32	64	71
Kidney, inflammation of.....	16	16	18	22	3	18	32	24	21	19	19	17	38	11	12
Measles.....	19	19	19	0	0	0	0	0	0	0	0	0	0	0	0
Neuralgia.....	68	63	58	50	61	63	62	62	63	79	73	58	64	71	76
Pleuritis.....	18	13	25	21	18	21	14	5	12	8	11	14	0	12	0
Pneumonia.....	29	27	21	33	50	48	18	34	14	6	4	3	0	21	9
Pyæmia.....	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0
Rheumatism.....	76	76	81	83	79	28	79	83	86	85	96	92	92	89	79
Scarlet fever.....	11	9	2	3	0	7	3	5	6	0	0	0	0	0	3
Small-pox.....	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis.....	46	47	36	67	65	42	36	38	28	33	19	25	22	11	41
Whooping-cough.....	14	12	0	0	0	0	0	0	0	0	0	0	0	0	0

*. †. d. See page 103. † Inflammation of bowels and inflammation of brain and inflammation of pleuritis was not compiled until 1884. For inflammation of bowels, an average for the 17 years, 1880-96; for neuralgia and tonsillitis, an average for the 18 years, 1879-96; pleuritis was not compiled until 1888; for other diseases and for the average line, an average for the 20 years, 1877-96.

TABLE 2.—CONCLUDED.—Diseases in the Southeastern Division of the State, for the Year and by Months in 1897; also an Average for the period of Twenty Years, 1877-1896, and an Average for the period of Eleven Years, 1886-1896.—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Diseases named.^a

Division.*	1877-1896.†	1886-1896.	1897.‡	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	82	51	14	21	12	14	15	16	10	15	16	16	15	13	16
Av. for Tab. Dis. Rep. Pres.															
Brain, inflammation of	9	5	0.3	0	0	0	0	0	0	0	0	0	4	0	0
Bowels, inflammation of	15	11	6	0	0	0	3	14	8	16	4	9	9	0	0
Bronchitis	63	45	45	43	47	58	48	45	32	41	44	34	46	36	21
Cerebro-spinal meningitis	5	2	0.3	0	0	0	0	0	0	0	0	0	0	0	0
Cholera infantum	12	9	7	0	0	0	0	5	4	16	20	22	15	8	3
Cholera morbus	18	13	9	0	0	0	3	0	2	20	24	28	23	12	3
Consumption, pulmonary	61	49	25	23	16	18	29	32	29	35	32	16	27	24	36
Croup, membranous	8	4	1	10	0	0	0	5	0	0	0	0	0	0	3
Diphtheria	20	9	7	13	8	4	13	14	0	4	4	0	4	12	9
Diarrhea	46	40	24	0	3	16	10	23	12	32	48	63	50	24	24
Dysentery	20	14	4	3	0	0	3	0	0	4	4	22	15	0	0
Erysipelas	26	20	5	0	3	2	10	9	0	16	8	0	0	4	0
Fever, intermittent	49	30	8	0	3	0	6	14	4	12	20	13	19	8	9
Fever, remittent	31	20	3	0	0	0	0	0	0	4	16	22	0	0	0
Fever, typhoid (enteric)	18	13	11	10	8	0	0	9	20	12	16	22	23	12	15
Fever, typho-malarial	16	8	0.3	0	0	0	0	0	4	0	0	0	0	0	0
Influenza	41	38	40	47	50	61	61	45	20	20	32	31	27	28	27
Kidney, inflammation of	23	23	7	3	5	11	10	14	1	8	1	0	15	4	9
Meadles	13	9	12	20	27	27	16	18	12	0	0	0	0	0	3
Neuralgia	52	48	45	40	34	49	61	59	20	41	52	38	38	52	58
Pleuritis	13	17	17	10	11	18	23	27	16	20	16	13	15	20	21
Pneumonia	32	22	11	13	13	27	26	27	4	0	4	6	12	0	9
Puerperal fever	7	5	1	3	3	0	0	0	0	0	0	4	4	0	0
Rheumatism	67	62	54	47	45	38	55	59	56	68	60	63	42	60	73
Scarlet fever	20	11	7	0	16	4	6	0	12	4	4	3	8	16	12
Small-pox	2	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis	44	42	40	37	31	51	39	55	28	40	32	41	35	40	45
Whooping-cough	19	11	0.8	3	0	0	0	0	0	4	0	0	0	0	3

* +, d. See page 103. † Inflammation of kidney was not compiled until 1881. For inflammation of bowels, an average for the 17 years, 1880-96; for neuralgia and tonsillitis an average for the 18 years, 1879-96; pleuritis was not compiled until 1888; for other diseases and for the average line, an average for the 20 years, 1877-96.

TABLE 4.—*A summary for the Year 1897, relative to Diseases in each of the Eleven Divisions of the State,—indicating the prevalence as regards both Time and Area.*

Diseases.	Upper Peninsular Division.*				Northwestern Division.*				Northern Division.*				Northeastern Division.*				Western Division.*			
	Per Cent of Observers Reporting Presence of. b	Av. Per Cent of Weeks Reported Present. c	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence where Present. e	Per Cent of Observers Reporting Presence of. b	Av. Per Cent of Weeks Reported Present. c	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence where Present. e	Per Cent of Observers Reporting Presence of. b	Av. Per Cent of Weeks Reported Present. c	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence where Present. e	Per Cent of Observers Reporting Presence of. b	Av. Per Cent of Weeks Reported Present. c	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence where Present. e	Per Cent of Observers Reporting Presence of. b	Av. Per Cent of Weeks Reported Present. c	Per Cent of Reports Stat- ing Presence of. d	Av. Order of Prevalence where Present. e
Av. for Tab. Dis. Reported Present.	23	71	17	3.5	30	62	19	2.8	26	60	16	2.4	30	71	22	3.0	32	64	21	2.4
Brain, inflammation of.	2	50	1	7.0	3	29	0.7	2.5	4	38	4.0	4.0	7	22	2	4.5	7	31	2	3.3
Bowels, inflammation of.	27	88	6	2.3	35	45	16	3.6	25	23	50	3.2	44	38	28	4.3	36	27	12	2.7
Cerebro-spinal meningitis.	67	92	2	2.2	69	68	48	2.0	73	69	50	2.6	74	88	43	2.4	72	37	49	3.6
Cerebro-striatum.	18	63	11	3.8	1	64	10	3.3	3	56	6	3.5	4	33	2	2.5	19	52	13	2.2
Cholera morbus.	16	63	11	3.8	1	64	10	3.3	3	56	6	3.5	4	33	2	2.5	19	52	13	2.2
Consumption, pulmonary.	24	93	22	2.7	34	88	27	2.6	11	39	1	2.3	19	26	5	3.6	26	41	11	2.7
Croup, membranous.	4	29	1	6.0	3	29	0.7	2.0	15	24	1	2.3	44	60	30	3.5	16	68	11	2.5
Diphtheria.	22	57	14	4.4	13	47	6	4.3	0	35	0.3	2.8	7	57	4	3.5	5	36	2	3.2
Diarrhea.	38	57	22	3.1	66	57	37	2.6	13	48	56	2.7	59	4	66	4	5	68	4	3.2
Dysentery.	51	79	40	3.2	37	66	31	3.6	33	43	15	3.7	43	33	1	3.0	69	69	50	2.4
Erysipelas.	11	40	4	5.3	34	42	14	3.5	53	20	3	2.7	48	66	33	4.0	43	45	20	2.8
Fever, intermittent.	4	57	2	6.0	31	81	32	2.1	8	42	3	2.8	3	4	33	3.0	38	52	18	2.6
Fever, remittent.	27	76	0	5.1	31	74	25	3.1	10	51	6	2.3	11	33	4	4.0	8	43	25	2.8
Fever, typhoid (enteric).	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fever, typho-malarial.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Influenza.	44	67	30	1.7	70	72	51	2.0	65	67	74	3.3	7	88	62	1.3	70	75	54	1.6
Kidney, inflammation of.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Measles.	11	57	5	4.2	13	56	8	3.4	52	23	3	3.4	56	89	53	3	53	37	31	2.8
Neuralgia.	55	90	48	3.2	73	75	54	2.2	31	79	19	1.9	44	70	67	1.5	43	47	6	2.1
Pleuritis.	22	42	10	4.7	37	53	20	3.3	25	48	11	3.6	52	75	43	4.1	38	54	22	3.1
Pneumonia.	44	59	26	4.2	48	43	21	3.4	26	37	6	2.3	7	23	17	4.2	39	56	23	3.0
Puerperal Fever.	65	81	53	3.4	20	33	6	3.2	86	78	67	2.3	74	87	66	2.2	88	73	1.9	1.9
Rheumatism.	9	53	3	4.3	8	42	4	4.5	6	40	3	2.4	11	50	6	2.7	9	72	7	1.4
Scarlet fever.	62	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Small-pox.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tonsillitis.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whooping-cough.	11	95	11	1.7	4	33	1	2.3	11	74	7	1.4	7	71	5	2.5	7	50	3	2.5

* For counties in each division, see Exhibit I.

b, c, d, e. See foot-notes with these marks in Table 2.

TABLE 4.—CONCLUDED.

Diseases.	Northern Central Division.*					Bay and Eastern Division.*					Central Division.*					Southwestern Div.*					Southern Central Division.*					Southeastern Div.*					
	Per Cent of Observers Re-ported Present where	Av. Per Cent of Weeks Re-ported Present where	Per Cent of Reports Stat-istic Present, c	Ing Prevalence of, d	Av. Order of Prevalence where Present, e	Per Cent of Observers Re-ported Present where	Av. Per Cent of Weeks Re-ported Present where	Per Cent of Reports Stat-istic Present, c	Ing Prevalence of, d	Av. Order of Prevalence where Present, e	Per Cent of Observers Re-ported Present where	Av. Per Cent of Weeks Re-ported Present where	Per Cent of Reports Stat-istic Present, c	Ing Prevalence of, d	Av. Order of Prevalence where Present, e	Per Cent of Observers Re-ported Present where	Av. Per Cent of Weeks Re-ported Present where	Per Cent of Reports Stat-istic Present, c	Ing Prevalence of, d	Av. Order of Prevalence where Present, e	Per Cent of Observers Re-ported Present where	Av. Per Cent of Weeks Re-ported Present where	Per Cent of Reports Stat-istic Present, c	Ing Prevalence of, d	Av. Order of Prevalence where Present, e						
Av. for Tab. Dis. Rep. Present . . .	25	69	17	2.5	3.8	25	61	15	2.8	2.8	27	65	18	2.8	2.8	29	68	20	2.9	2.9	36	65	17	3.0	23	61	14	1.9	1.9		
Brain, inflammation of	17	64	10	3.8	3.8	7	34	2	1.9	2.9	8	41	3	2.9	2.9	10	31	3	4.7	4.7	5	23	2	4.1	1	25	32	6	2.0	2.0	
Bowels, inflammation of	13	54	8	4.0	4.0	22	35	8	3.5	3.4	22	39	9	3.4	3.4	31	52	16	4.2	4.2	18	44	8	3.2	-18	25	32	6	1.8	1.8	
Bronchitis	54	83	48	2.9	2.9	60	69	41	2.9	2.5	71	79	56	2.5	2.5	0.9	50	0.5	3.0	3.0	61	75	46	2.8	61	75	45	2.0	2.0	2.0	
Cerebro-spinal meningitis	0	0	0	0	0	5	31	2	3.6	3.1	11	48	6	3.0	3.0	28	46	13	3.5	3.5	11	44	12	3.5	14	49	7	1.6	1.6	1.6	
Cholera infantum	25	60	18	3.2	3.2	12	48	6	3.1	3.1	19	46	9	2.9	2.9	28	46	13	3.5	3.5	21	59	12	3.5	14	49	7	1.2	1.2	1.2	
Cholera morbus	25	70	17	2.8	2.8	19	39	8	3.1	3.1	28	46	9	2.9	2.9	28	46	13	3.5	3.5	21	59	12	3.5	14	49	7	1.2	1.2	1.2	
Consumption, pulmonary	54	100	50	2.5	2.5	23	67	15	3.3	3.2	29	91	28	3.2	3.2	26	78	20	2.1	2.1	21	80	17	3.5	34	85	9	3.0	3.0	3.0	
Croup, membranous	0	0	0	0	0	3	33	1	3.8	3.8	1	25	0.4	0.4	0.4	3	30	0.8	3.0	3.0	1	27	0.4	2.0	2	27	0.4	1.8	1.8	1.8	
Diphtheria	0	0	0	0	0	16	51	8	2.3	2.3	6	42	2	1.5	1.5	10	57	6	2.3	2.3	6	43	2	4.4	17	42	7	2.1	2.1	2.1	
Diarrhea	58	60	36	2.4	2.4	44	62	28	3.2	3.2	39	63	38	2.5	2.5	52	65	35	2.6	2.6	42	63	27	2.9	45	52	24	1.5	1.5	1.5	
Dysentery	17	53	10	2.0	2.0	18	46	8	3.2	3.2	27	53	15	3.1	3.1	26	51	13	3.6	3.6	18	55	10	3.8	12	38	5	1.6	1.6	1.6	
Erysipelas	13	46	8	3.7	3.7	21	69	12	3.8	3.8	30	51	15	3.0	3.0	32	49	17	4.0	4.0	21	47	11	3.8	12	38	5	1.6	1.6	1.6	
Fever, remittent	38	68	23	2.2	2.2	26	60	16	2.4	2.4	55	57	15	2.9	2.9	48	70	36	2.7	2.7	34	55	10	3.8	17	44	3	1.6	1.6	1.6	
Fever, remittent	17	41	8	2.5	2.5	13	49	6	2.8	2.8	23	48	11	3.0	3.0	29	56	17	3.7	3.7	21	45	5	3.8	15	39	11	1.5	1.5	1.5	
Fever, typhoid (enteric)	21	48	11	1.0	1.0	18	53	9	3.6	3.6	9	61	5	3.2	3.2	9	63	6	2.7	2.7	10	45	5	4.3	15	39	11	1.5	1.5	1.5	
Fever, typho-malarial	0	0	0	0	0	4	30	1	3.2	3.2	2	40	0.7	0.7	0.7	0.3	3	0.3	2.0	2.0	3	48	1	3.2	53	20	0.3	1.0	1.0	1.0	
Influenza	54	67	36	2.3	2.3	61	77	48	1.6	1.6	74	45	2	1.8	1.8	73	77	59	2.0	2.0	53	77	41	3.2	53	20	0.3	1.0	1.0	1.0	
Kidney, inflammation of	25	90	21	3.3	3.3	19	58	11	4.0	4.0	22	55	13	3.7	3.7	31	56	19	4.0	4.0	29	50	15	3.4	20	73	40	1.4	1.4	1.4	
Measles	13	36	4	1.7	1.7	18	45	8	2.0	2.0	25	66	17	2.6	2.6	31	56	19	2.7	2.7	32	70	16	2.4	63	69	17	1.5	1.5	1.5	
Neuralgia	67	87	58	2.3	2.3	61	73	44	3.7	3.7	75	80	60	3.6	3.6	74	85	63	3.7	3.7	77	86	66	2.7	63	69	17	1.5	1.5	1.5	
Pneumonia	25	43	8	3.7	3.7	36	57	20	3.3	3.3	36	43	16	3.4	3.4	33	62	21	3.5	3.5	39	53	22	3.8	28	38	11	2.3	2.3	2.3	
Pneumonia	13	64	8	3.3	3.3	36	57	20	3.3	3.3	36	43	16	3.4	3.4	33	62	21	3.5	3.5	39	53	22	3.8	28	38	11	2.3	2.3	2.3	
Rheumatism	75	83	59	1.8	1.8	68	75	51	3.9	3.9	83	82	69	2.3	2.3	91	93	81	2.3	2.3	85	91	6	2.6	73	73	54	2.0	2.0	2.0	
Scarlet fever	0	0	0	0	0	58	3	3.7	3.7	3.7	8	40	3	3.1	3.1	9	35	2	3.0	3.0	10	60	0.2	2.9	15	46	7	1.6	1.6	1.6	
Small-pox	0	0	0	0	0	65	65	43	2.6	2.6	67	64	43	2.8	2.8	58	0	0	0	0	0	63	70	41	2.9	61	68	40	1.9	1.9	1.9
Tonsillitis	58	61	34	2.6	2.6	65	65	43	2.6	2.6	67	64	43	2.8	2.8	58	0	0	0	0	0	63	70	41	2.9	61	68	40	1.9	1.9	1.9
Whooping-cough	13	67	7	3.0	3.0	18	59	11	2.0	2.0	4	47	2	1.6	1.6	0	0	0	0	0	8	67	5	2.1	3	30	0.8	3.0	3.0	3.0	3.0

b, c, d, e. See foot-notes with these marks in Table 2.

* For counties in each division, see Exhibit I.

DISEASES IN MICHIGAN, ARRANGED IN ORDER OF PREVALENCE, THOSE WHICH CAUSED MOST SICKNESS FIRST.

EXHIBIT A.—*Order of Prevalence of twenty-eight diseases in Michigan, in the period of thirteen years, 1885–1897, and in each of those years, judging from the “Per Cent of Reports,” which stated the presence of each of the diseases, in connection with the reported “Order of Prevalence” when and where each disease was present. (The method of rating diseases for this Exhibit is described and illustrated in a “Compiling Table” on pages 122 and 123 of the Annual Report for 1890.)*

Order, 1885–97.	Diseases arranged in order of greatest prevalence.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.
1	Rheumatism	1	1	3	1	1	2	2	1	1	1	1	1	3
2	Neuralgia	3	2	1	2	2	1	3	2	2	2	2	2	1
3	Bronchitis	4	4	4	3	4	3	4	3	3	3	3	3	4
4	Influenza	2	3	2	4	3	4	1	4	8	8	8	8	8
5	Diarrhea	6	6	5	5	6	5	5	5	4	6	6	7	7
6	Tonsillitis	5	5	6	6	5	6	6	7	7	7	7	6	6
7	Intermittent fever	10	8	7	8	7	7	8	8	5	4	5	4	2
8	Consumption, pul.	11	7	10	7	8	9	7	6	6	5	4	5	5
(9)	(The average disease)	10	7	8	9	10	9	10	9	10	11	11	10	10
9	Remittent fever	20	9	9	9	9	8	9	9	9	9	9	9	9
10	Pneumonia	18	10	16	16	12	11	13	10	10	10	10	10	10
11	Whooping-cough	8	11	8	10	11	10	10	13	11	20	19	12	13
12	Cholera morbus	14	12	11	12	13	14	12	12	15	15	12	14	15
13	Dysentery	16	13	13	13	17	17	17	14	13	13	13	15	19
14	Inflammation of kidney	21	16	14	17	16	12	14	15	14	16	15	13	12
15	Measles	7	14	18	11	10	16	11	11	22	12	16	22	25
16	Cholera infantum	13	17	12	15	15	15	15	17	18	18	18	17	18
17	Erysipelas	22	20	23	21	21	21	19	15	12	11	11	11	11
18	Typho-mal. fever	12	21	20	23	22	22	20	19	17	14	14	16	14
19	Pleuritis*	26	15	21	22	20	19	18	18	16	17	-----	-----	-----
20	Scarlet fever	19	18	19	14	19	13	22	22	21	22	22	20	20
21	Typhoid fever (ent.)	25	19	17	18	14	20	16	20	20	21	21	21	21
22	Inflammation of bowels	23	22	22	20	23	23	21	21	19	19	17	18	17
23	Diphtheria	15	24	27	19	18	18	23	23	24	23	20	19	16
24	Puerperal fever	24	23	24	24	24	26	25	24	23	24	23	24	24
25	Membranous croup	17	26	28	27	25	27	24	25	26	26	25	25	23
26	Small-pox	9	28	15	26	28	28	28	28	28	28	27	27	27
27	Inflammation of brain	27	27	26	28	26	25	26	27	27	27	24	23	22
28	Cerebro-spi. men.	28	25	25	25	27	24	27	26	25	25	26	26	26

* Pleuritis was not compiled until 1888.

DISEASES WHICH CAUSE MOST SICKNESS IN MICHIGAN.

This is shown in this report in Exhibit A, and more specifically in Exhibit VI., in this report, and in similar exhibits in previous reports. The question is differently answered in different years. For many years after the compilation of weekly reports was begun, intermittent fever appeared to be the leading cause of sickness in Michigan.

By Exhibit A, one may see that in the year 1885 neuralgia, in the years 1886-90 rheumatism, in 1891 influenza, in 1892 neuralgia, in 1893-94 rheumatism, in 1895 neuralgia, and in 1896-7 rheumatism appeared to have caused most sickness in Michigan. This does not necessarily imply that there was an increase in rheumatism or neuralgia, because one disease *may* exhibit a higher relative order of prevalence on account of some other disease or diseases having been actually lessened in prevalence.

The "Average Disease" of those reported, is included in Exhibit A, as a standard by which to judge the fluctuations. It may be seen that in 1890, the "Average Disease" was higher (9) by one-tenth, than the average (10) of a series of years; in 1891 it was lowered to the average; in 1892 it was again higher by one-tenth than the average; in 1893 it was again lowered to the average; in 1894 it was again one-tenth higher; in 1895 it was two-tenths higher, in 1896 it was three-tenths higher than the average, and in 1897 it was lowered to the average.

In this connection it should be stated that the average number of diseases reported on each card has gradually decreased for the past thirteen years. This is shown in Exhibit B, as follows:—

EXHIBIT B.—*Stating for each of the thirteen years, 1885-97, the number of card reports received, the total number of disease reports and the average number of diseases reported on each card; also the averages for the twelve years, 1885-96.*

Year.	Number of card reports received.	Number of disease reports.	Av. number of diseases on each card.
1885.....	5,108	35,752	7.00
1886.....	5,583	38,640	6.92
1887.....	4,896	33,048	6.75
1888.....	5,047	33,270	6.59
1889.....	5,000	32,612	6.52
1890.....	4,939	33,934	6.87
1891.....	4,291	28,741	6.70
1892.....	5,281	31,269	5.92
1893.....	5,853	32,723	5.59
1894.....	5,572	30,619	5.50
1895.....	4,394	24,004	5.46
1896.....	3,940	19,443	4.93
Av. for the 12 years, 1885-96.....	4,992	31,171	6.23
1897.....	4,418	21,828	4.94

In 1890 rheumatism, neuralgia, bronchitis and influenza, in order named, headed the list. In 1891 influenza, rheumatism, neuralgia and bronchitis headed the list. In 1892 neuralgia, rheumatism, bronchitis and influenza headed the list. In 1893 rheumatism, neuralgia, influenza and bronchitis, in 1894 rheumatism, neuralgia, bronchitis and influenza, in 1895 neuralgia, influenza, rheumatism and bronchitis, in 1896 rheumatism, neuralgia, influenza and bronchitis, and in 1897 rheumatism, influenza, neuralgia and bronchitis, in the order named, appear to have caused most sickness in Michigan.

Nearly the same diseases appear above the average line each year. Pneumonia has appeared tenth in order for eleven years in succession, ending with 1890, and dropped to thirteenth in 1891, rising in 1892 to eleventh and dropped in 1893 to twelfth, in 1894-1895 to sixteenth, rising again in 1896 to tenth, and dropped to eighteenth in order in 1897. Some of the diseases of minor importance vary considerably in their order. Whooping-cough, for example, was twelfth in order in 1886, dropped to nineteenth in 1887, to twentieth in 1888, and rose to eleventh in 1889, dropped to thirteenth in 1890, and rose to tenth in 1891 and 1892, dropped to eleventh in 1893, rose to tenth in 1894 and eighth in 1895, dropped in 1896 to eleventh, and rose to eighth in order in 1897.

Exhibit VII. supplies data relative to what diseases caused most sickness in 1897 in each of the several geographical divisions of Michigan. It may be seen that there is evidence that there are very great differences in the different parts of the State. Further evidence is very desirable, however, in order to reach conclusions on this important subject. The exhibit will be found of great interest to those who study it carefully, and in connection with previous reports.

The lines for 1897, in Exhibit XIII., are graphically represented in Diagrams 1, 2, 3 and 4 of this article.

EXHIBIT VI.—Diseases from which there seems to have been the Most Sickness in Michigan in 1897, as indicated by the Per Cent of Weekly Reports Stating Presence of the Diseases, as studied in connection with the Average Order of Prevalence of said Diseases when Reported Present; also Order, Per Cent of Reports and Average Order for the same Diseases in 1896, 1895, 1894 and 1893.

1897.			1896.			1895.			1894.			1893.		
Order.*	Diseases in Order of Apparent amount of Sickness in 1897, Most Prevalent Disease First.	Per Cent of Reports Stating Presence of, d	Order.*	Per Cent of Reports Stating Presence of, d	Av. Order of Prevalence when Present, e	Order.*	Per Cent of Reports Stating Presence of, d	Av. Order of Prevalence when Present, e	Order.*	Per Cent of Reports Stating Presence of, d	Av. Order of Prevalence when Present, e	Order.*	Per Cent of Reports Stating Presence of, d	Av. Order of Prevalence when Present, e
		when Present, e												
More sickness than Av. for 28 Diseases.	1 Rheumatism.....	66 2.3	1	60 2.3		3	60 2.7		1	62 2.6		1	64 2.6	
	2 Influenza.....	47 1.8	3	44 1.8		2	44 2.0		4	41 2.2		3	43 2.0	
	3 Neuralgia.....	58 2.4	2	54 2.3		1	56 2.5		2	53 2.5		2	57 2.5	
	4 Bronchitis.....	50 2.6	4	51 2.4		4	52 2.6		3	50 2.6		4	53 2.5	
	5 Tonsillitis.....	43 2.6	5	45 2.6		6	43 3.0		6	42 3.0		5	49 2.8	
	6 Diarrhea.....	34 2.5	6	34 2.5		5	42 2.5		5	40 2.5		6	40 2.6	
	7 Measles.....	13 2.3	14	7 2.7		18	4 3.1		11	6 2.8		10	7 2.8	
	8 Whooping-cough.....	4 2.1	11	7 2.4		8	9 2.6		10	12 2.9		11	9 3.0	
	9 Small-pox.....	.05 2.0	28	4 6.3		15	0.3 2.8		26	0.6 4.1		28	0.3 4.8	
(10)	Average.....	17 2.7	(7)	18 2.7		(8)	20 3.0		(9)	20 3.0		(10)	20 3.3	
Less than said Average.	10 Fever, intermittent.....	17 2.7	8	19 2.7		7	22 2.9		8	24 2.9		7	24 2.9	
	11 Consumption, pulmonary...	20 3.1	7	23 3.0		10	29 3.5		7	36 3.4		8	38 3.5	
	12 Typho-malarial fever.....	0.9 2.7	19	10 3.3		20	4 3.2		23	4 3.7		22	4 3.6	
	13 Cholera infantum.....	8 2.9	17	8 2.9		12	12 3.0		15	12 3.3		15	10 3.4	
	14 Cholera morbus.....	10 3.0	12	11 2.9		11	15 3.0		12	14 3.3		13	14 3.3	
	15 Diphtheria.....	5 2.9	24	5 3.7		27	5 4.4		19	7 3.5		18	7 3.4	

* Judging from the per cent of reports which stated presence of the diseases in connection with the order of prevalence when present. The method of rating diseases, as causes of sickness, as shown in Exhibits VI and VII., is fully described and illustrated by a "Compiling Table" on pages 122 and 123 of the Annual Report for the year 1890.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received, for the times specified, from all observers in the State. It combines and states in a general way, an idea of the time a disease was prevalent, with an idea of the area of its prevalence.

e The disease having the greatest number of cases was to be marked 1, in the order: the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals of the Order of Prevalence columns in Table 3 (omitted in this report), by the number of observers who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported d present, by the sum of the numbers of observers who reported the different diseases present, thus counting each observer once for every disease he reported present. As a rule, small numbers in this column indicate the large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present, by each observer, from week to week, the greater will be the average in this column.

EXHIBIT VII.—CONCLUDED.

	Order.*	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports stating Presence of, ^d	Av. Order of Preva- lence when Pres. ^e	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports stating Presence of, ^d	Av. Order of Preva- lence when Pres. ^e	Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First.	Per Cent of Reports stating Presence of, ^d	Av. Order of Preva- lence when Pres. ^e
More Sickness than Av. for 28 Diseases.		BAY AND EAST'N DIV.†			CENTRAL DIVISION.†			SOUTHWEST'N DIV.†		
	1	Influenza.....	48	1.6	Rheumatism.....	69	2.3	Rheumatism.....	81	2.3
	2	Rheumatism.....	51	2.5	Influenza.....	45	2.0	Influenza.....	59	2.0
	3	Neuralgia.....	44	2.5	Neuralgia.....	60	2.6	Neuralgia.....	63	2.7
	4	Tonsillitis.....	43	2.6	Bronchitis.....	56	2.5	Bronchitis.....	57	2.7
	5	Bronchitis.....	41	2.9	Diarrhea.....	38	2.5	Diarrhea.....	35	2.5
	6	Diarrhea.....	38	2.3	Tonsillitis.....	43	2.8	Tonsillitis.....	36	2.6
	7	Whooping-cough.....	11	2.0	Diphtheria.....	2	1.5	Consumption, pul.....	20	2.1
	8	Measles.....	8	2.0	Typho-mal. fever.....	0.7	1.8	Fever, intermittent.....	36	2.7
	9	Fever, intermittent.....	16	2.4	Measles.....	17	2.5	Measles.....	6	2.1
	(10)	.....	.....	.....	Average.....	18	2.8	Puerperal fever.....	1	2.0
	10	Brain, inflam. of.....	2	1.9	Consumption, pul.....	28	3.2	Typho-mal. fever.....	0.3	2.0
	11	Diphtheria.....	8	2.3	Fever, intermittent.....	15	2.9	Diphtheria.....	6	2.3
	(12)	Average.....	15	2.8	.....	.....	.....	.....	.....	.....
	12	Pneumonia.....	20	3.3	Dysentery.....	15	3.0	Average.....	20	2.9
	(13)	.....	.....	.....	.....	.....	.....	.....	.....	.....
Less.	13	Fever, remittent.....	6	2.8	Puerperal fever.....	1	2.6	Typhoid fever(ent.).....	6	2.7
	14	Pleuritis.....	21	3.7	Cholera morbus.....	9	2.9	Cholera infantum.....	14	3.2
	15	Cholera morbus.....	8	3.1	Erysipelas.....	15	3.1	Pneumonia.....	21	3.5
		SOUTH'N CENT. DIV.†			SOUTHEASTERN DIVISION.†					
	1	Rheumatism.....	70	2.3	Influenza.....				40	1.4
	2	Neuralgia.....	66	2.4	Rheumatism.....				54	2.0
	3	Influenza.....	41	2.2	Bronchitis.....				45	2.0
	4	Bronchitis.....	46	2.8	Neuralgia.....				45	2.0
	5	Tonsillitis.....	44	2.9	Tonsillitis.....				40	1.9
	6	Measles.....	22	2.4	Diarrhea.....				24	1.5
	7	Diarrhea.....	27	2.9	Cholera morbus.....				9	1.2
	8	Whooping-cough.....	5	2.1	Pleuritis.....				17	1.5
	9	Croup, membranous.....	0.4	2.0	Cerebro-spl. men.....				0.3	1.0
	10	Small-pox.....	0.2	2.0	Typho-mal. fever.....				0.3	1.0
	(11)	Average.....	17	3.0	.....				.....	.....
Less.	11	Fever, intermittent.....	20	3.4	Typhoid fever (ent.).....				11	1.5
	12	Consumption, pul.....	17	3.5	Fever, intermittent.....				8	1.5
	13	Pneumonia.....	22	3.8	Cholera infantum.....				7	1.6
	14	Kidney, inflam. of.....	15	3.4	Scarlet fever.....				7	1.6
	(15)	.....	.....	.....	Average.....				14	1.9
	15	Dysentery.....	10	3.3	Erysipelas.....				5	1.6

* , d, e. Foot-notes with these marks are under Exhibit VI.

† The counties in each division are stated in Exhibit I.

EXHIBIT VIII.—Names of Stations where were made the Observations of Meteorological Conditions used in Exhibit X., and following exhibits; relative to Sickness and Meteorological Conditions in 1897, also the Temperature, Humidity, Cloudiness, Ozone, Velocity of Wind and Atmospheric Pressure, at each Station for which Observations of the given condition are included in the summary statement relative to that condition in said exhibit.

Stations.* (Those of the U. S. Weather Bureau in Italics.)	Temperature.		Humidity.		Per Cent of Cloudiness.	Ozone.		Wind, Av. Velocity.	Atmospheric Pressure.		
	Average Daily Range.	Average.	Relative.	Absolute.		Day.	Night.		Range.		Average.
									Monthly.	Average Daily.	
Number of Stations in- cluded in Average..... }	16	10	8	8	10	8	8	8	10	10	10
Average	17.82	46.57	78	3.57	57	3.67	4.10	9.4	.934	.212	29.073
Rockland.....	21.28	41.15			59	5.28	5.94		1.034	.241	28.576
Marquette.....	14.39							9.7			
Sault Ste. Marie.....	16.84							8.8			
Traverse City.....	19.88	45.16	83	3.47	58	6.57	6.65		.962	.204	29.316
Alpena.....	14.25							9.2			
Harrisville.....	18.30	43.76	68	3.03	70	2.54	2.99		.953	.216	29.331
Grand Haven.....	16.08							10.1			
Port Huron.....	15.85							10.6			
Thornville.....	15.93	47.89	80	3.65	54	4.31	5.63		.957	.213	28.979
Agricultural College.....	22.74	47.01	91	4.17	52				.903	.199	29.104
Lansing, S. B. of H.....	19.42	47.62	71	3.36	60	2.12	2.50	9.7	.914	.206	29.081
Ann Arbor.....	20.54	47.86	81	3.63	54	1.60	1.63	7.7	.900	.213	29.049
Battle Creek.....	15.58	49.26			54	2.58	2.21		.892	.211	28.944
Tecumseh.....	19.01	47.29	76	3.52	50	4.33	5.23		.859	.193	29.151
Birmingham.....	20.00	48.47	77	3.76	60				.962	.221	29.096
Detroit.....	14.93							9.1			

* Observations of range of temperature were made with registering thermometers read and set at the Stations of the U. S. Weather Bureau as follows:—the maximum at the morning observation, the minimum at the evening observation, at 9 P. M. at Ann Arbor, and at 7 A. M. at other stations. For the ozone observations, the test-paper was exposed from 7 A. M. to 2 P. M. for the day observations, and from 9 P. M. to 7 A. M. for the night observations. The velocity of wind was recorded by registering anemometers. These subjects are treated by months in 1897 and for previous years, in an article on Meteorological Conditions in Michigan in 1897, on pages 1-82 of this Report.

CLIMATE AND SICKNESS.*

Exhibit X. (and similar exhibits in previous Reports) is an attempt to learn something of the relations of bronchitis to meteorological conditions, by noting whether each meteorological condition was above or below its average for the year, in months when more or in months when less bronchitis than the average for the year was reported. The months are arranged in order according to the prevalence of bronchitis; those months in which most bronchitis was reported being placed first in the column; those in which more bronchitis than the average was reported are placed above the average line; the others below that line. The meteorological conditions for each month are printed, in the proper columns, in the line for the month. The statements being thus arranged, it is easy to see whether the temperature, the velocity of the wind, or any other condition represented, was above its annual average in months when more than the average amount of bronchitis was reported, or *vice versa*.

That the comparisons may the more readily be held in mind, propositions have been made concerning the relations of bronchitis to meteorological conditions, grouping the conditions into two classes. The letters *a* and *b* in the exhibit mark exceptions to these propositions. It is not supposed that the propositions are in every case true concerning every disease; but the propositions serve to bring out the evidence of the exhibit on the subject in question. This evidence is appreciated by noting the number and force of the exceptions to the propositions, and also whether the exception is explained by facts shown in other columns. A summary of the evidence is presented in Exhibit XXV., near the close of this article.

Exhibits and propositions similar to those relative to bronchitis, but relating to other diseases, are given on following pages. The propositions are differently stated for the summer diseases (beginning with the exhibit on diarrhea) and for the winter diseases (beginning with that on bronchitis), but they are not changed to fit the individual diseases under each class.

Relations of Bronchitis to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis, these conditions were **less** than the average for the year. In Exhibit X., the letter *a* marks exceptions to this proposition for the year 1897.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, the average daily temperature, the average daily range of temperature†, the absolute humidity of the atmosphere and the average daily pressure of the atmosphere‡ were **less** than the average for the year; and in months when **less**

* The remarks under this head are applicable, also, by changing the name of the diseases to diseases treated of in Exhibits XII., XIV., XV., XVI. and XVII., on the following pages. The meteorological data are from places indicated in Exhibit VIII.

† The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893, Annual Report for 1894.

than the average per cent of reports stated the presence of bronchitis these conditions were **greater** than the average for the year. In Exhibit X., the letter *b* marks exceptions to this proposition for months in 1897.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 2, it is true also that the quantity of vapor inhaled daily was **less** than the average, and the quantity exhaled daily in excess of that inhaled was **greater** than the average in months when **more** than the average per cent of reports stated presence of bronchitis; and that **more** vapor was inhaled and a **less** excess exhaled daily in months when the per cent of reports stating presence of bronchitis was **less** than the average.

Proposition 3 also holds true in relation to pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis and pulmonary consumption, treated in Exhibits XII., XIV., XV., XVI. and XVII., on following pages.

What per cent of weekly reports received in 1897 stated presence of bronchitis is graphically represented by months in Diagram 1.

The evidence of Exhibit X. confirms that of similar exhibits relating to bronchitis in previous years.

What per cent of the reports received stated presence of bronchitis by months in each of the years 1877-97; also the averages for 1877-96 and 1886-96, and a comparison of 1897 with those averages, are shown in Exhibit XI.

Relations of Pneumonia and other "Cold Weather" Diseases to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption or average disease), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind and the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of the reports stated the presence of pneumonia (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibits XII., XIV., XVII., and XXVIII., the letter *a* marks exceptions to this proposition for the year 1897.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption or average disease), the average daily temperature, the average daily range of temperature,* the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere,* were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of pneumonia (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibits XII., XIV., XVII., and XXVIII., the letter *b* marks exceptions to this proposition for the year 1897.

* The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893, Annual Report for 1894.

What per cent of the weekly reports received in 1897 stated presence of pneumonia is graphically represented by months in Diagram 1. What per cent of the weekly reports received stated presence of pneumonia, and of the other diseases mentioned in the two preceding propositions by months in the years 1896 and 1897, is stated in Exhibit XIII., where are also given an average for the twenty years, 1877-1896, also for the eleven years, 1886-1896, and a comparison of 1897 with those averages.

From Exhibit XIII., it may be seen that pneumonia was considerably less in the year and each month of the year 1897, than the averages for the twenty years, 1877-1896, and in the year and years, 1886-1896.

The average temperature was slightly higher in 1897 than the average for the twenty years, 1877-1896. In 1897, it was also higher in the months of January, February, March, July, September and October; and lower in the months of April, May, June, August, November and December.

The absolute humidity was slightly more in 1897 than the average for the twenty years, 1877-1896. In 1897, it was more in the months of January, February, March, April, July, September, October and November; and less in the months of May, June, August and December, than the average in the corresponding months in the twenty years, 1877-1896.

EXHIBIT XI.—SICKNESS FROM BRONCHITIS, 1877-97.—*By Year and Months for each of the twenty-one years, 1877-97, and an average for the twenty years, 1877-96, also for the eleven years, 1886-96; Stating on what per cent of the Weekly Reports received Bronchitis was reported present, and comparing the Per Cents of 1897, with the Averages for corresponding months in those Years.*

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average, 20 years, 1877-96.....	59	72	73	72	69	59	50	41	40	46	54	63	67
Average, 11 years, 1886-96.....	56	68	69	69	66	57	47	40	38	45	53	59	63
1877.....	55	76	72	72	65	45	31	25	22	37	48	71	77
1878.....	64	77	75	74	71	65	56	41	45	55	60	73	81
1879.....	64	88	87	83	78	65	54	40	41	50	59	65	77
1880.....	64	81	84	82	68	59	57	44	45	46	57	67	72
1881.....	62	86	86	80	78	62	53	38	37	44	44	66	68
1882.....	65	73	70	75	74	70	62	51	44	57	59	71	71
1883.....	66	77	80	82	76	70	62	56	53	53	57	61	69
1884.....	61	71	71	71	65	59	56	49	47	50	56	69	70
1885.....	56	73	74	76	73	56	52	44	39	45	51	58	64
1886.....	56	71	69	71	65	57	45	40	37	41	51	61	65
1887.....	55	67	69	67	62	57	49	41	38	47	57	57	61
1888.....	59	63	76	74	68	63	55	41	39	49	59	59	65
1889.....	58	65	68	60	68	61	50	49	44	51	57	64	62
1890.....	65	71	74	76	74	66	56	50	52	54	65	73	79
1891.....	60	81	79	81	76	64	48	43	36	44	48	57	68
1892.....	54	72	70	64	67	56	47	37	38	42	50	57	63
1893.....	53	67	67	62	64	54	42	35	34	39	48	61	62
1894.....	50	63	60	61	58	49	42	32	36	43	52	53	57
1895.....	52	66	71	70	66	56	47	34	34	35	44	52	52
1896.....	51	59	60	59	56	45	39	36	35	46	53	59	61
1897.....	50	59	66	63	60	46	46	35	40	41	43	47	53
In 1897 Less than Average 1877-96.....	9	13	7	9	9	13	4	6	=	5	11	16	14
In 1897 Greater than Average 1886-96*.....	---	---	---	---	---	---	---	---	2	---	---	---	---
In 1897 Less than Average 1886-96*.....	6	9	3	6	6	11	1	5	---	4	10	12	10

*This comparison is made because of change of plan of reports in May, 1885, as explained on page 84.

The relative humidity was slightly more in 1897 than the average for the nineteen years, 1878-1896. In 1897, it was more in the months of March, April, May, June, July, August, September and October. In January, February, November and December it was the same as the average.

EXHIBIT X.—BRONCHITIS.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Bronchitis and what were the Meteorological Conditions as observed at Stations in Michigan.**

BRONCHITIS.				Tempera- ture, F.		Humidity of Air, Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative Scale of 10 ²		Atmospheric Pressure, Inches. Reduced to 32° F.				
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present, †.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled ‡.	Exhaled in ex- cess of that Inhaled. §.	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.	
													Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions. ‖.		
More than Av. Per Cent of Bronchitis.	Feb.	66	2.4	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.061
	Mar.	63	2.4	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Apr.	60	2.6	13.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b 29.100
	Jan.	59	2.3	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b 29.076
	Dec.	53	2.3	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Average....	50	2.6	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Bronchitis.	Nov.	47	2.5	b 14.20	b 36.06	a 80	b 2.38	1.49	10.19	a 71	3.34	3.77	a 11.2	a 1.099	a .281	29.073
	May	46	2.6	19.72	53.55	76	3.91	2.44	9.24	52	a 4.08	a 4.58	9.2	.798	.183	b 29.035
	June ..	46	2.5	20.77	63.07	76	5.26	3.29	8.39	43	a 3.73	a 4.23	7.9	.521	.131	b 29.022
	Oct.	43	2.9	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a 1.039	a .215	29.127
	Sept.	41	2.8	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	Aug.	40	3.0	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b 29.047
	July	35	2.9	19.89	73.28	76	6.85	4.23	7.40	40	3.02	3.67	7.3	.491	.034	b 29.000

a An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was greater than the average for the year; and less in months when the same condition was less than the average. See proposition 1, relating to bronchitis, page 122.

b An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was less than the average for the year and less in months when the same condition was greater than the average for the year. See proposition 2, relating to bronchitis, page 122.

* How many stations, and what stations are represented in the statements for each meteorological subject may be seen by referring to Exhibit VIII., in which the stations are named, and a statement for the year 1897, in relation to each meteorological subject, is given for each station included in the average for that subject. In Exhibit VIII., is also stated what time the tri-daily observations were made at each station. Additional statements relative to meteorological conditions may be found in an article on the Principal Meteorological Conditions in Michigan in 1897, on pages 1-32 of this Report.

† Explanations of statements in these columns, and other statements relative to the prevalence, in 1897, of the diseases under consideration may be found in Tables 2 and 4 of this article, and also in Diagrams 1, 2, 3, 4 and 5. When the per cent of reports stated for any disease is the same for two months or for any month is the same as the average, the order of months in the first column of these exhibits has been determined by reference to fractional per cents.

‡ Small numbers in this column indicate great prevalence in the localities where the disease occurred, as compared with other diseases; and large numbers a less prevalence.

§ Calculated from readings of dry bulb and wet bulb thermometers.

|| Calculated for 18 respirations per minute, of 20 cubic inches of air each.

¶ Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which case each cubic foot of air contains 15.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.68 Troy ounces of vapor exhaled daily. No correction has been made for the expansion of air after it is inhaled.

** The daily range from which numbers in this column were computed is the difference between the highest and the lowest of the four observations taken during the 24 hours, namely, at 7 A. M., 2 P. M., 9 P. M. of one day, and 7 A. M. of the following day.

EXHIBIT XII.—PNEUMONIA AND MEMBRANOUS CROUP.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Pneumonia and Membranous Croup and what were the Meteorological Conditions as observed at Stations in Michigan.**

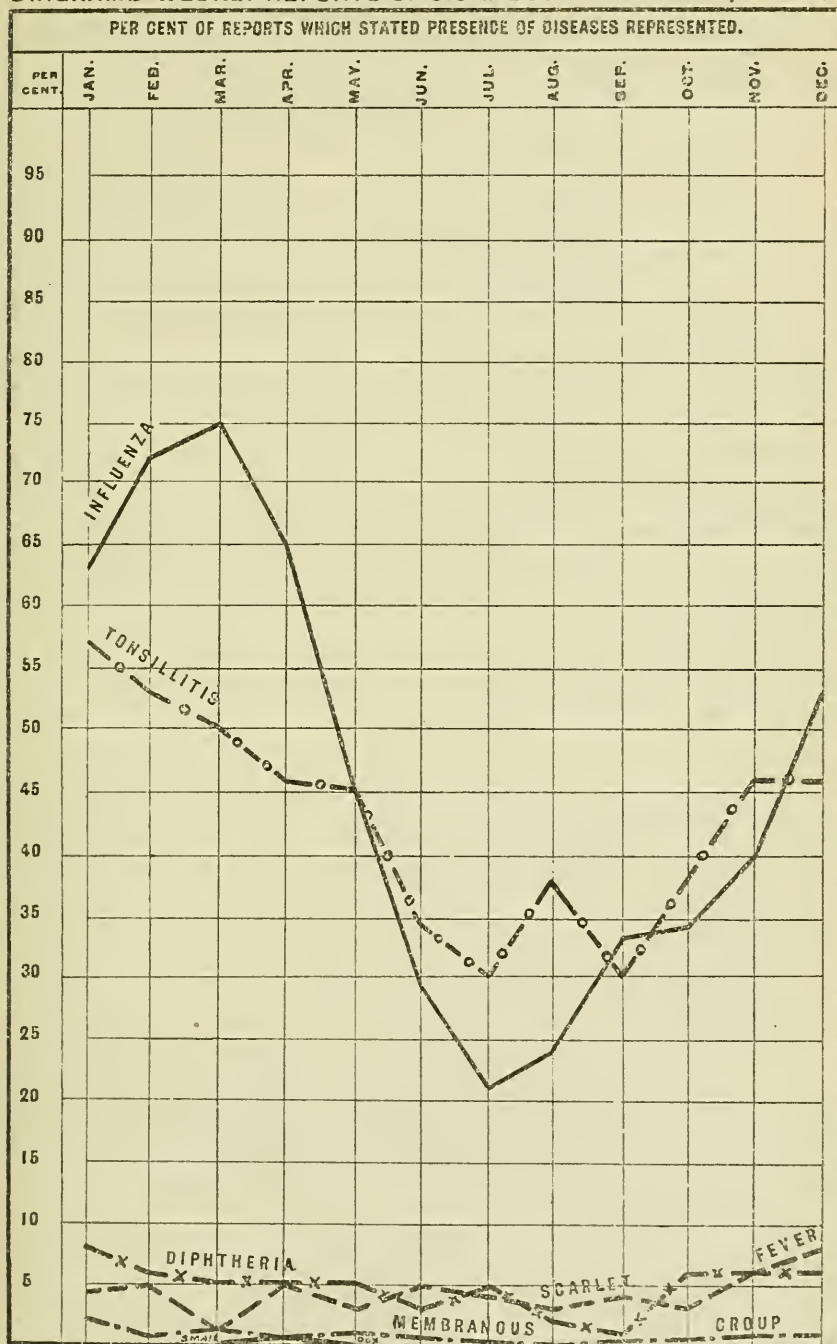
PNEUMONIA.				Temperature, F.		Humidity of Air, % Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative Scale of 10°		Per Miles Per Hour by Anemometer.		Atmospheric Pres- sure, Inches. Reduced to 32° F.		
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.		Per Cent of Weekly Re- ports Stating Presence of. Av. Order of Prevalence where Present, †, ‡															Av. Daily Range by Reg- istering Thermometers. Average of Three Daily Observations.		Relative Per Cent of Saturation. Absolute — Grains of Vapor in a Cu- bic Foot of Air.		Average Per Cent of Cloudiness.		Day Observation, 7 A. M. to 2 P. M. Night Observation, 9 P. M. to 7 A. M.
				Inhaled.	Exhaled in ex- cess of that Inhaled.	Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions, †, ‡	Average Pressure.								
More than Av. Per Cent of Pneumonia.	Feb.	35	3.2	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.061
	Mar.	34	3.5	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Jan.	31	3.1	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b 29.076
	Apr.	27	3.7	b 18.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b 29.100
	May	24	3.5	b 19.72	53.55	a 76	b 3.91	2.44	9.24	a 52	4.08	4.58	a 9.2	a .798	a .183	29.035
	Dec.	20	3.1	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Av.	19	3.4	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Pneumonia.	Nov.	17	3.5	b 14.20	b 36.06	a 80	b 2.38	1.49	10.19	a 71	3.34	3.77	a 11.2	a 1.099	a .281	29.073
	June	10	3.6	20.77	63.07	76	5.26	3.27	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b 29.022
	Oct.	10	3.5	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a 1.039	a .215	29.127
	Sept.	6	3.6	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.217
	Aug.	4	3.5	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b 29.047
	July	3	2.9	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	b 29.000
MEMBRANOUS CROUP.																
More than Av. Per Cent of Membranous Croup.	Jan.	2	2.2	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b 29.076
	Mar.	1	4.0	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Dec.	1	2.3	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	May	0.9	1.7	b 19.72	53.55	a 76	b 3.91	2.44	9.24	b 52	4.08	4.58	a 9.2	a .798	a .183	29.035
	Nov.	0.9	4.3	14.20	36.06	80	2.38	1.49	10.19	71	a 3.34	a 3.77	11.2	1.099	.281	29.073
Av.	0.7	2.9	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073	
Less than Av. Per Cent of Membranous Croup.	Apr.	0.6	3.0	18.74	b 43.93	77	b 2.93	1.83	9.85	a 60	a 3.79	a 4.26	a 11.0	a 1.109	a .241	29.100
	Oct.	0.6	6.0	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a 1.039	a .215	29.127
	Feb.	0.5	2.0	b 12.78	b 25.64	a 82	b 1.58	.99	10.69	a 78	a 4.29	a 4.80	a 10.0	a 1.024	a .234	b 29.069
	June	0.5	4.5	20.77	63.07	76	5.26	3.29	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b 29.022
	Sept.	0.5	3.0	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	July	0.3	2.0	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	b 29.000
	Aug.	0	0	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b 29.047

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Pneumonia and Membranous Croup, on page 123.

b An exception to Proposition 2, relating to Pneumonia and Membranous Croup, on page 123.

DIAGRAM 2—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1897.



128 STATE BOARD OF HEALTH—REPORT OF SECRETARY, 1898.

EXHIBIT XIII.—*By Year and Months for 1897 and for the preceding year, and an Average for the twenty years, 1877-96,* also for the eleven years, 1886-96. Stating on what Per Cent of the Weekly Reports received PNEUMONIA, MEMBRANOUS CROUP, DIPHTHERIA, RHEUMATISM, INFLUENZA, SCARLET FEVER, NEURALGIA* AND TONSILLITIS,* were Reported Present, and Comparing the Per Cents for months in 1897 with the Averages for Corresponding Months in those years.†*

Years, etc.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Pneumonia.	Av. 20 years, 1877-1896.	31	51	54	52	45	33	20	13	11	14	18	28	37	5	8	7	6	5	4	3	2	2	3	4	6	7
	Av. 11 years, 1886-1896.	25	43	45	43	37	27	15	10	8	11	15	23	31	3	5	5	4	4	3	2	1	1	2	3	4	5
	1896.....	18	23	30	39	26	11	13	10	7	7	12	18	20	1	7	0	0	0	1	0	0	0	1	1	2	2
	1897.....	19	31	35	34	27	24	10	3	4	6	10	17	20	0	7	0	0	1	0	0	0	0	0	0	0	1
	In 1897 Greater than Av. 1877-1896.	12	20	19	18	18	9	10	10	7	8	8	11	17	4	3	6	5	5	4	4	3	1	2	5	4	6
	In 1897 Less than Av. 1877-96.	12	20	19	18	18	9	10	10	7	8	8	11	17	4	3	6	5	5	4	4	3	1	2	5	4	6
	In 1897 Greater than Av. 1886-1896.	12	20	19	18	18	9	10	10	7	8	8	11	17	4	3	6	5	5	4	4	3	1	2	5	4	6
	In 1897 Less than Av. 1886-96.	12	20	19	18	18	9	10	10	7	8	8	11	17	4	3	6	5	5	4	4	3	1	2	5	4	6
	In 1897 Greater than Av. 1886-96.	12	20	19	18	18	9	10	10	7	8	8	11	17	4	3	6	5	5	4	4	3	1	2	5	4	6
	In 1897 Less than Av. 1886-96.	12	20	19	18	18	9	10	10	7	8	8	11	17	4	3	6	5	5	4	4	3	1	2	5	4	6
Diphtheria.	Av. 20 years, 1877-1896.	14	18	16	13	13	11	10	11	11	11	18	19	18	67	70	70	72	74	70	66	60	57	60	65	69	70
	Av. 11 years, 1886-1896.	7	9	7	6	6	6	6	5	6	7	10	11	10	65	68	69	71	72	70	66	60	57	60	65	66	68
	1896.....	5	5	5	2	1	3	3	3	2	6	10	12	9	60	62	63	62	67	61	55	54	52	54	60	65	63
	1897.....	5	8	6	5	5	3	3	5	2	1	6	6	6	60	67	65	65	65	66	68	67	60	67	66	68	66
	In 1897 Greater than Av. 1877-1896.	9	10	10	8	8	6	7	5	9	10	12	13	12	1	3	5	7	9	4	2	7	3	7	1	1	4
	In 1897 Less than Av. 1877-96.	9	10	10	8	8	6	7	5	9	10	12	13	12	1	3	5	7	9	4	2	7	3	7	1	1	4
	In 1897 Greater than Av. 1886-1896.	9	10	10	8	8	6	7	5	9	10	12	13	12	1	3	5	7	9	4	2	7	3	7	1	1	4
	In 1897 Less than Av. 1886-96.	9	10	10	8	8	6	7	5	9	10	12	13	12	1	3	5	7	9	4	2	7	3	7	1	1	4
	In 1897 Greater than Av. 1886-96.	9	10	10	8	8	6	7	5	9	10	12	13	12	1	3	5	7	9	4	2	7	3	7	1	1	4
	In 1897 Less than Av. 1886-96.	9	10	10	8	8	6	7	5	9	10	12	13	12	1	3	5	7	9	4	2	7	3	7	1	1	4
Influenza.	Av. 20 years, 1877-1896.	41	62	66	63	55	39	27	19	19	26	32	42	52	14	18	17	18	17	15	13	10	9	10	13	14	15
	Av. 11 years, 1886-1896.	41	65	69	67	57	40	25	17	17	24	31	41	55	10	13	11	12	13	11	10	7	6	8	11	11	12
	1896.....	44	60	78	79	55	30	22	18	16	27	39	49	58	8	16	10	11	9	5	5	6	5	6	3	6	12
	1897.....	47	63	72	75	65	45	29	21	24	33	34	40	53	4	4	5	1	5	3	5	4	3	4	3	6	8
	In 1897 Greater than Av. 1877-1896.	6	1	6	12	10	6	2	2	5	7	2	1	1	10	14	12	17	12	12	8	6	6	6	10	8	7
	In 1897 Less than Av. 1877-96.	6	1	6	12	10	6	2	2	5	7	2	1	1	10	14	12	17	12	12	8	6	6	6	10	8	7
	In 1897 Greater than Av. 1886-1896.	6	1	6	12	10	6	2	2	5	7	2	1	1	10	14	12	17	12	12	8	6	6	6	10	8	7
	In 1897 Less than Av. 1886-96.	6	1	6	12	10	6	2	2	5	7	2	1	1	10	14	12	17	12	12	8	6	6	6	10	8	7
	In 1897 Greater than Av. 1886-96.	6	1	6	12	10	6	2	2	5	7	2	1	1	10	14	12	17	12	12	8	6	6	6	10	8	7
	In 1897 Less than Av. 1886-96.	6	1	6	12	10	6	2	2	5	7	2	1	1	10	14	12	17	12	12	8	6	6	6	10	8	7
Neuralgia.	Av. 18 years, 1879-1896.	63	67	69	71	70	94	61	57	55	57	61	64	65	47	58	58	58	53	47	39	33	32	36	44	53	58
	Av. 11 years, 1886-1896.	61	66	68	70	68	63	59	56	54	55	59	62	63	46	57	57	57	53	46	37	33	31	35	44	52	57
	1896.....	54	65	62	64	57	50	50	44	43	45	56	59	57	45	57	52	49	46	37	32	33	30	40	47	56	58
	1897.....	58	59	58	66	66	61	54	53	53	53	56	59	61	43	57	53	50	46	45	34	30	38	30	38	46	46
	In 1897 Greater than Av. 1879-1896.	5	8	11	5	4	3	7	4	2	4	5	5	4	4	1	5	8	7	2	5	3	1	6	6	7	12
	In 1897 Less than Av. 1879-96.	5	8	11	5	4	3	7	4	2	4	5	5	4	4	1	5	8	7	2	5	3	1	6	6	7	12
	In 1897 Greater than Av. 1886-1896.	5	8	11	5	4	3	7	4	2	4	5	5	4	4	1	5	8	7	2	5	3	1	6	6	7	12
	In 1897 Less than Av. 1886-96.	5	8	11	5	4	3	7	4	2	4	5	5	4	4	1	5	8	7	2	5	3	1	6	6	7	12
	In 1897 Greater than Av. 1886-96.	5	8	11	5	4	3	7	4	2	4	5	5	4	4	1	5	8	7	2	5	3	1	6	6	7	12
	In 1897 Less than Av. 1886-96.	5	8	11	5	4	3	7	4	2	4	5	5	4	4	1	5	8	7	2	5	3	1	6	6	7	12
	In 1897 Less than Av. 1886-96.	5	8	11	5	4	3	7	4	2	4	5	5	4	4	1	5	8	7	2	5	3	1	6	6	7	12

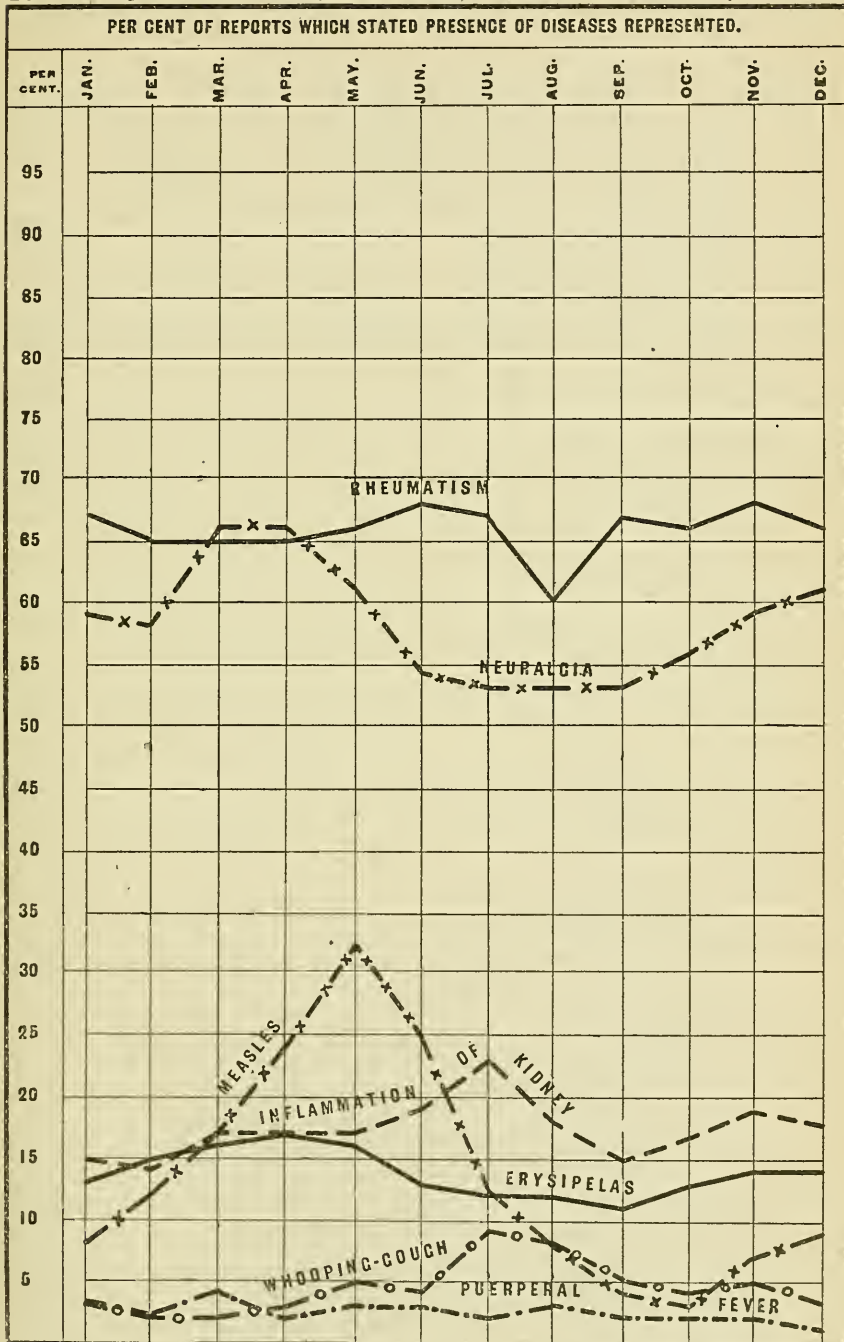
* For neuralgia and tonsillitis an average for the 18 years, 1879-1896.

† Other statements for 1897, and months in 1897, relative to these diseases are given in Table 2, and in Exhibits XII, XIV, XV, and XVI, where are also given for convenient comparison statements of coincident meteorological conditions.

‡ This comparison is made because of change of plan of reports in May, 1885, as explained on page 54.

The lines for 1897 in Exhibit XIII. are graphically represented in Diagrams 1. 2. 3 and 4 of this article.

DIAGRAM 3—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1897.



[PLATE 1000.]

EXHIBIT XIV.—DIPHTHERIA AND TONSILLITIS.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Diphtheria and Tonsillitis and what were the Meteorological Conditions as Observed at Stations in Michigan.**

DIPHTHERIA.				Tempera- ture, F.		Humidity of Air. [°] / ₁₀₀ . Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy ounces.		Ozone, Relative. Scale of 10°.			Per Av. Velocity of Wind, Miles Per Hour by Anemometer.		Atmospheric Pres- sure, Inches. Reduced to 32° F.			
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present. †, ‡.	Av. Daily Range by Reg- istering Thermometers.															Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled. ||	Exhaled in Ex- cess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Monthly and for year.	Av. Daily, by 3 Daily Observa- tions. **	Average Pressure.
				More than Av. Per Cent of Diphtheria.	Jan.	8	2.5	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8												1.323	.247	b	29.076
	Feb.	6	2.7	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234		29.069	
	Oct.	6	3.0	b 19.82	b 53.45	a 77	b 3.89	2.43	9.25	a 46	a 2.97	a 3.17	a 8.6	1.039	.215	b	29.127	
	Nov.	6	3.4	14.20	36.06	80	2.38	1.49	10.19	71	a 3.34	a 3.77	11.2	1.099	.281		29.073	
	Dec.	6	2.0	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267		29.045	
	Av.		5	2.9	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212		29.073
Less than Av. Per Cent of Diphtheria.	Mar.	5	2.4	b 16.73	b 31.86	a 81	b 2.00	1.25	10.43	a 62	a 4.13	a 4.73	a 10.9	a 1.394	a .366	b	29.063	
	Apr.	5	3.3	18.74	b 43.93	77	b 2.93	1.83	9.85	a 60	a 3.79	a 4.26	a 11.0	a 1.109	a .241		29.100	
	May.	5	3.8	19.72	53.55	76	¶ 9.1	2.44	9.24	52	a 4.08	a 4.58	9.2	.798	.183	b	29.035	
	July	5	3.0	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.095	b	29.000	
	June	3	3.2	20.77	63.07	76	5.26	3.29	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b	29.022	
	August ..	2	2.5	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b	29.047	
	Sept.	1	3.0	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152		29.215	
TONSILLITIS.																		
More than Av. Per Cent of Tonsillitis.	Jan.	57	2.4	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b	29.076	
	Feb.	53	2.7	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234		29.069	
	Mar.	50	2.7	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366		29.063	
	Apr.	46	2.8	b 18.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b	29.100	
	Nov.	46	2.4	14.20	36.06	80	2.38	1.49	10.19	71	a 3.34	a 3.77	11.2	1.099	.281		29.073	
	Dec.	46	2.4	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267		29.045	
	May.	45	2.5	b 19.72	b 53.55	a 76	b 3.91	2.44	9.24	a 52	4.08	4.58	a 9.2	a .798	a .183		29.035	
	Av.	43	2.6	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212		29.073	
Less than Av. Per Cent of Tonsillitis.	Aug.	38	2.9	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b	29.047	
	Oct.	38	2.6	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a 1.039	a .215		29.127	
	June	34	2.5	20.77	63.07	76	5.26	3.29	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b	29.022	
	July	30	2.6	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	b	29.000	
	Sept.	30	3.2	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152		29.215	

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Diphtheria and Tonsillitis, on page 123.

b An exception to Proposition 2, relating to Diphtheria and Tonsillitis, on page 123.

EXHIBIT XV.—INFLUENZA AND SCARLET FEVER.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Influenza and Scarlet Fever and what were the Meteorological Conditions as observed at Stations in Michigan.**

INFLUENZA.			Temper- ature, F.		Humidity of Air. % Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative, Scale of 10°.		Atmospheric Pres- sure, Inches, Reduced to 32° F.					
Months in Order of Great- est Per Cent of Weekly Reports Stating Pres- ence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present, †, ‡.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute—Grains of Vapor in a Cubic Foot of Air.	Inhaled. ||		Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.	
							Inhaled. ||	Exhaled in ex- cess of that Inhaled. ¶					Monthly and for year.	Av. Daily by 3 Daily Observa- tions. **		
More than Av. Per Cent of Influenza.	Mar....	75	1.3	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Feb....	72	1.4	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Apr....	65	1.7	b18.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b 29.100
	Jan....	63	1.4	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b 29.076
	Dec....	53	1.8	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
Av.		47	1.8	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Influenza.	May....	45	2.1	19.72	53.55	76	3.91	2.44	9.24	52	a 4.08	a 4.58	9.2	.798	.183	b 29.035
	Nov....	40	1.9	b14.20	b36.06	a 80	b 2.38	1.49	10.19	a 71	3.34	3.77	a 11.2	a1.099	a .281	29.073
	Oct....	34	2.3	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a1.039	a .215	29.127
	Sept....	33	2.2	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	June....	29	2.4	20.77	63.07	76	5.26	3.29	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b 29.022
	Aug....	24	2.6	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b 29.047
July....		21	2.5	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	b 29.000
SCARLET FEVER.																
More than Av. Per Cent of Scarlet Fever.	Dec....	8	2.9	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Nov....	6	2.7	14.20	36.06	80	2.38	1.49	10.19	71	a 3.34	a 3.77	11.2	1.099	.281	29.073
	Feb....	5	3.4	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Apr....	5	3.1	b18.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b 29.100
	June..	5	2.7	b20.77	b63.07	a 76	b 5.26	3.29	8.39	a 48	3.73	4.23	a 7.9	a .521	a .131	29.022
Av.		4	3.0	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Scarlet Fever.	Jan....	4	4.0	b14.11	b22.40	a 83	b 1.57	.98	10.70	a 78	a 4.32	a 4.22	a 10.8	a1.323	a .247	29.076
	July....	4	3.9	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	b 29.000
	Sept....	4	2.0	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	May....	3	2.4	19.72	53.55	76	3.91	2.44	9.24	52	a 4.08	a 4.58	9.2	.798	.183	b 29.035
	Aug....	3	2.7	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b 29.047
	Oct....	3	2.5	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a1.039	a .215	29.127
Mar....		1	2.6	b16.73	b31.86	a 81	b 2.00	1.25	10.43	a 62	a 4.13	a 4.73	a 10.9	a1.394	a .366	b 29.063

*, †, ‡, §, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Influenza and Scarlet Fever, on page 123.

b An exception to Proposition 2, relating to Influenza and Scarlet Fever, on page 123.

EXHIBIT XVI.—RHEUMATISM AND NEURALGIA.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Rheumatism and Neuralgia and what were the Meteorological Conditions as Observed at Stations in Michigan.**

RHEUMATISM.		Temperature, F.		Humidity of Air, Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		Atmospheric Pressure, Inches. Reduced to 32° F.						
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.							Av. Order of Prevalence where Present, †, ‡.	Av. Daily Range by Registering Thermometers.			Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cubic Foot of Air.	Inhaled.	Exhaled in excess of that Inhaled. †	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.
		Monthly and for Year.	Av. Daily, by 3 Daily Observations. ‡.	Average Pressure.												
More than Av. Per Cent of Rheumatism.	June...	68	2.0	b20.77	b63.07	a 76	b 5.26	3.29	8.39	a 48	3.73	4.23	a 7.9	a .521	a .131	29.022
	Nov....	68	2.0	14.20	36.06	80	2.38	1.49	10.19	71	a 3.34	a 3.77	11.2	1.099	.281	29.073
	Jan....	67	2.4	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b29.076
	July...	67	2.1	b19.89	b13.28	a 76	b 6.85	4.28	7.40	a 40	a 3.02	a 3.67	a 7.3	a .491	a .094	a29.000
	Sept...	67	2.2	b23.30	b64.22	a 77	b 5.18	3.24	8.44	a 30	a 2.64	a 3.04	a 7.5	a .668	a .152	b29.215
Av.		66	2.3	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Rheumatism.	May...	66	2.3	19.72	53.55	76	3.91	2.44	9.24	52	a 4.08	a 4.58	9.2	.798	.183	b29.035
	Oct....	66	2.3	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a1.039	a .215	29.127
	Dec....	66	2.2	b13.15	b25.75	a 83	b 1.71	1.07	10.61	a 82	a 3.73	a 4.41	a 10.1	a1.070	a .267	b29.045
	Feb....	65	2.7	b12.78	b25.64	a 82	b 1.58	.99	10.69	a 78	a 4.29	a 4.80	a 10.0	a1.024	a .234	b29.069
	Mar....	65	2.7	b16.73	b31.86	a 81	b 2.00	1.25	10.43	a 62	a 4.13	a 4.73	a 10.9	a1.394	a .366	b29.063
	April...	65	2.4	18.74	b43.93	77	b 2.93	1.83	9.85	a 60	a 3.79	a 4.26	a 11.0	a1.109	a .241	29.100
Aug...		60	2.1	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b29.047
NEURALGIA.																
More than Av. Per Cent of Neuralgia.	Mar....	66	2.6	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	April...	66	2.4	b18.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b29.100
	May...	61	2.5	b19.72	b53.55	a 76	b 3.91	2.44	9.24	a 52	4.08	4.58	a 9.2	a .798	a .183	29.035
	Dec....	61	2.3	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Jan....	59	2.5	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b29.076
	Nov....	59	2.2	14.20	36.06	80	2.38	1.49	10.19	71	a 3.34	a 3.77	11.2	1.099	.281	29.073
Av.		58	2.4	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Neuralgia.	Feb....	58	2.6	b12.78	b25.64	a 82	b 1.58	.99	10.69	a 78	a 4.29	a 4.80	a 10.0	a1.024	a .234	b29.069
	Oct....	56	2.4	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a1.039	a .215	29.127
	June...	54	2.2	20.77	63.07	76	5.26	3.29	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b29.022
	July...	53	2.2	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	b29.000
	Aug...	53	2.3	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	b29.047
	Sept...	53	2.4	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215

*, †, ‡, §, ||, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Rheumatism and Neuralgia, on page 123.

b An exception to Proposition 2, relating to Rheumatism and Neuralgia, on page 123.

EXHIBIT XVII.—PULMONARY CONSUMPTION AND PLEURITIS.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Pulmonary Consumption and Pleuritis and what were the Meteorological Conditions as Observed at Stations in Michigan.**

CONSUMPTION.				Tempera- ture, F.		Humidity of Air. % Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°		Atmospheric Pres- sure, Inches. Reduced to 32° F.				
Months in Order of Great- est Per Cent of Weekly Reports stating Pres- ence of.	Per cent of Weekly Re- ports stating Presence of.	Av. Order of Prevalence where Present. †, ‡	Av. Daily Range by Reg- istering Thermometers.											Av. of Three Daily Ob- servations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in Ex- cess of that Inhaled. ¶	Av. Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.
				Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions. **	Average Pressure.										
More than Av. Per Cent of Consumption.	Mar....	23	3.3	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	3.66	29.063
	July ...	23	2.5	19.89	673.28	a 76	b 6.85	4.28	7.40	a 40	a 3.02	a 3.67	a 7.3	a .491	a .094	29.000
	Jan....	22	3.3	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b29.076
	May ...	22	3.1	19.72	653.55	a 76	b 3.91	2.44	9.24	a 52	4.08	4.58	a 9.2	a .798	a .183	29.035
	June....	22	3.1	20.77	663.07	a 76	b 5.26	3.29	8.39	a 48	3.73	4.23	a 7.9	a .521	a .131	b29.022
	Aug....	22	3.2	20.60	665.59	a 77	b 5.61	3.51	8.17	a 40	3.96	4.32	a 7.7	a .670	a .128	29.047
	Apr....	21	3.2	18.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b29.100
Av.	20	3.1	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073	
Less than Av. Per Cent of Con- sumption.	Feb.	20	3.7	12.78	625.64	a 82	b 1.58	.99	10.69	a 78	a 4.29	a 4.80	a 10.0	a 1.024	a .234	b29.069
	Sept.	18	3.1	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	Oct.	16	2.9	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a 1.039	a .215	29.127
	Nov.	14	2.9	14.20	636.06	a 80	b 2.38	1.49	10.19	a 71	3.34	3.77	a 11.2	a 1.099	a .281	29.073
	Dec.	13	3.1	13.15	625.75	a 83	b 1.71	1.07	10.61	a 82	a 3.73	a 4.41	a 10.1	a 1.070	a .267	b29.045
PLEURITIS.																
More than Av. Per Cent of Pleuritis.	Apr....	26	3.8	18.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b29.100
	Mar....	25	4.0	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Jan....	22	3.7	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b29.076
	Feb....	21	3.8	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	May ...	19	3.5	19.72	653.55	a 76	b 3.91	2.44	9.24	a 52	4.08	4.58	a 9.2	a .798	a .183	29.035
	Dec....	19	3.1	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
Av.	18	3.6	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073	
Less than Av. Per Cent of Pleuritis.	Nov. ...	16	3.3	14.20	636.06	a 80	b 2.38	1.49	10.19	a 71	3.34	3.77	a 11.2	a 1.099	a .281	29.073
	Oct.	15	3.9	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	a 1.039	a .215	29.127
	June ...	13	3.6	20.77	63.07	76	5.26	3.29	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b29.022
	Sept....	13	3.3	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	July ...	11	2.8	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	b29.000
	Aug. ...	11	3.0	20.60	65.59	77	5.61	3.51	8.17	40	a 3.96	a 4.32	7.7	.670	.128	47

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

α An exception to Proposition 1, relating to Pulmonary Consumption and Pleuritis, on page 123.

∘ An exception to Proposition 2, relating to Pulmonary Consumption and Pleuritis, on page 123.

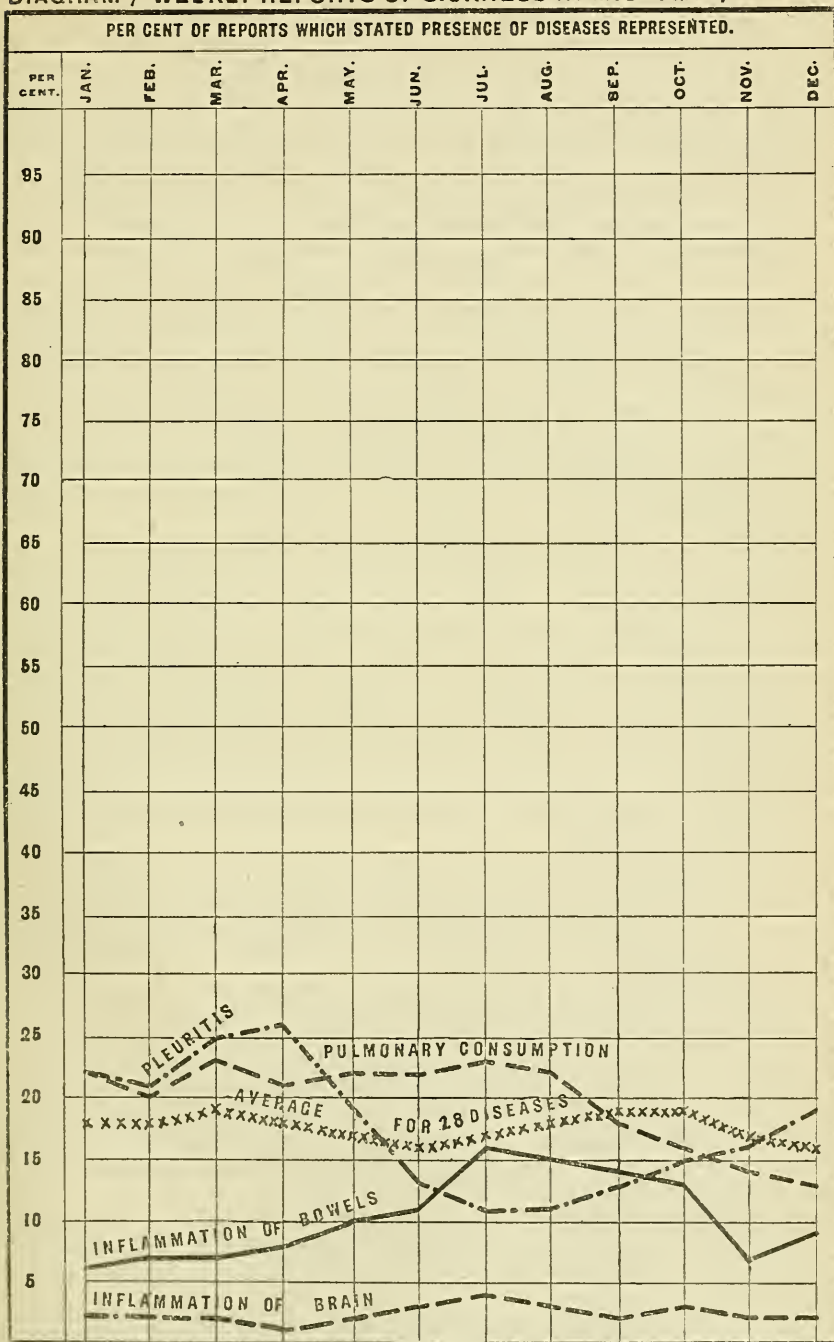
EXHIBIT XVIII.—SICKNESS FROM CONSUMPTION.—1877-97.—*By Year and Months for each of the twenty-one years, 1877-97, and an Average for the nineteen years, 1878-96,* also for the eleven years, 1886-97; Stating on what Per Cent of the Weekly Reports received CONSUMPTION was reported Present, and Comparing the Per Cents for 1897 with the Averages for corresponding Months in those Years.*

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 19 years, 1878-96*.....	52	54	55	56	57	55	53	51	50	50	51	50	51
Average 11 years, 1886-96.....	43	45	44	46	47	45	42	41	41	40	40	40	41
1877*.....	52	50	47	47	53	49	50	43	35	38	54	68	65
1878.....	71	67	72	76	75	72	68	68	65	70	73	73	71
1879.....	70	71	71	69	77	74	73	69	67	67	69	67	64
1880.....	68	65	69	70	72	70	69	66	62	66	66	68	70
1881.....	71	74	76	73	76	69	68	67	67	70	73	74	67
1882.....	66	66	68	66	66	69	66	67	63	63	65	62	65
1883.....	61	69	66	66	65	62	61	59	55	57	58	58	60
1884.....	63	56	61	66	70	67	65	63	63	63	65	61	58
1885.....	58	60	68	71	69	58	61	56	52	54	55	56	56
1886.....	55	61	58	60	61	60	55	51	52	48	51	55	54
1887.....	51	53	54	61	61	54	48	48	47	45	48	47	50
1888.....	49	50	51	52	47	53	56	51	49	44	43	44	48
1889.....	48	49	49	50	50	46	47	47	46	50	52	49	51
1890.....	52	50	53	55	61	57	52	45	50	51	51	49	55
1891.....	49	58	51	54	59	55	46	45	43	43	44	46	45
1892.....	38	45	45	40	41	33	35	39	37	39	36	34	37
1893.....	38	35	38	43	45	43	37	35	37	37	32	37	38
1894.....	36	36	33	33	41	40	37	39	35	37	34	33	29
1895.....	29	33	31	33	34	29	30	29	28	25	25	24	24
1896.....	23	22	24	22	21	26	24	22	25	25	22	22	21
1897 (see Diagram on opposite page).....	20	22	20	23	21	22	22	23	22	18	16	14	13
In 1897 Less than Av. 1878-96.....	32	32	35	33	36	33	31	28	28	32	35	36	38
In 1897 Less than Av. 1886-96†.....	23	23	24	23	26	23	20	18	19	22	24	26	18

* As consumption was not printed on the first blanks, nor on all used in 1877, that year is excluded from the average line.

† This comparison is made because of change of plan of reports in May, 1885, is explained on page 82.

DIAGRAM 4-WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1897.



Relations of Diarrhea to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **less** than the average for the year. In Exhibit XIX., the letter *a* marks exceptions to this proposition for the year 1897.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **greater** than the average for the year. In Exhibit XIX., the letter *b* marks exceptions to this proposition for 1897.

Explanations of Propositions 1 and 2 are given on page 122, and a summary of the evidence in Exhibit XIX., is given in Exhibit XXVI., on a following page.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 1, it is true also that the quantity of vapor inhaled daily was **greater** than the average, and the quantity exhaled daily in excess of that inhaled was **less** than the average in months when **more** than the average per cent of reports stated presence of diarrhea; and that **less** vapor was inhaled and a **greater** excess exhaled daily in months when the per cent of reports stating presence of diarrhea was **less** than the average.

Proposition 3 is true also in relation to cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, whooping-cough, cholera morbus and dysentery, treated in Exhibits XIX., XXI., XXII., XXIII. and XXIV.

On what per cent of the weekly reports received, by months in the twenty years, 1877-1896, the ten foregoing diseases were reported present, is stated in Exhibit XX. In Diagram 1, is graphically represented by months what per cent of the reports in each month in 1897 stated the presence of diarrhea.

The greatest sickness reported from diarrhea in 1897, was in the months of July, August, September, October and November.

As shown by Exhibit XX., the reports indicate a decreased prevalence of diarrhea in the year 1897. Compared with the year 1896, there was a slightly increased prevalence of diarrhea in April, May and September; a slightly decreased prevalence in February, March, July and August; a marked increase in October, November and December, and a marked decrease in January and June.

Compared with the average for corresponding months in the twenty years, 1877-1896, the per cent of reports of diarrhea in 1897 show a decreased prevalence in each month of the year, except in October and November.

The average temperature was slightly higher in 1897, than the average for the twenty years, 1877-1896. In 1897 it was also higher in the months of January, February, March, July, September and October; and lower in the months of April, May, June, August, November and Decem-

ber. The absolute humidity was slightly more in 1897 than the average for the twenty years, 1877-1896. In 1897, it was more in the months of January, February, March, April, July, September, October and November; and less in the months of May, June, August and December than the average in the corresponding months in the twenty years, 1877-1896. The relative humidity was slightly more in 1897 than the average for the nineteen years, 1878-1896. In 1897 it was more in the months of March, April, May, June, July, August, September and October. In January, February, November and December it was the same as the average.

Relations of Cholera Infantum and other "Warm Weather" Diseases to Meteorological Conditions.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles, or whooping-cough), the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibits XIX., XXI.-XXIV., the letter *a* marks exceptions to this proposition for the year 1897.

Explanations of Propositions 1 and 2 are given on page 122, and a summary of the evidence of Exhibit XIX. is given in Exhibit XXVI., on a following page.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, or whooping-cough), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were **less** than the average for the year; and that in months when **less** than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibits XIX., XXI.-XXIV., the letter *b* marks exceptions to this proposition for 1897.

What per cent of all the weekly reports of sickness in each month in 1897, stated the presence of cholera infantum is graphically represented by months in Diagram 1. What per cent of the reports received by months in the twenty years, 1877-1896, stated presence of cholera infantum and of the other diseases mentioned in Propositions 1 and 2, is stated in Exhibit XX., on a subsequent page.

Cholera infantum was most prevalent during the hot months in 1897. Compared with the average for the twenty years, 1877-1896, it was more prevalent in 1897 in the month of October, and less prevalent in the months of January, February, March, April, June, July, August, September, November and December. In May it was the same.

Special mention is here made relative to the remarkable decrease in the prevalence of intermittent fever, remittent fever, typho-malarial fever and whooping-cough, in the year and in each month of the year 1897, when compared with the averages for the twenty years, 1877-1896, and for the eleven years, 1886-1896, as shown in Exhibit XX.

EXHIBIT XIX.—DIARRHEA AND CHOLERA INFANTUM.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Diarrhea and Cholera Infantum and what were the Meteorological Conditions as observed at Stations in Michigan.**

DIARRHEA.			Tempera- ture, F.		Humidity of Air, % Av. of 3 Daily Ob- servations		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°		Atmospheric Pres- sure, Inches. Reduced to 32°, F.					
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present. †.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute—Grains of Vapor in a Cubic Foot of Air.	Inhaled. †		Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.	
							Inhaled. †	Exhaled in Ex- cess of that Inhaled. ‡					Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions. ‡.		
More than Av. Per Cent of Diarrhea.	Sept...	66	1.8	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	Aug...	63	1.9	20.60	65.59	77	5.61	3.51	8.17	40	b 3.96	b 4.32	7.7	.670	.128	a 29.047
	Oct....	58	2.0	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	b 1.039	b .215	29.127
	July...	46	1.9	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	a 29.000
	Av.....	34	2.5	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Diarrhea.	Nov...	34	2.8	14.20	36.06	80	2.38	1.49	10.19	71	b 3.34	b 3.77	11.2	1.099	.281	29.073
	June...	27	2.6	a 20.77	a 63.07	b 76	a 5.26	3.29	8.39	b 48	3.73	4.23	b 7.9	b .521	b .131	29.022
	May...	24	3.0	a 19.72	a 53.55	b 76	a 3.91	2.44	9.24	b 52	4.08	4.58	9.2	b .798	b .183	29.035
	Dec...	22	2.8	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Apr...	20	3.5	a 18.74	43.93	b 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	a 29.100
	Feb...	19	3.1	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Mar...	19	3.3	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Jan....	14	3.3	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	a 29.076
CHOLERA INFANTUM.																
More than Av. Per Cent of Chol- era Infantum.	Sept...	27	3.0	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	Aug...	22	2.5	20.60	65.59	77	5.61	3.51	8.17	40	b 3.96	b 4.32	7.7	.670	.128	a 29.047
	Oct....	17	3.1	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	b 1.039	b .215	29.127
	July...	16	2.7	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	a 29.000
	Av.....	8	2.9	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Cholera Infantum.	June...	5	2.9	a 20.77	a 63.07	b 76	a 5.26	3.29	8.39	b 48	3.73	4.23	b 7.9	b .521	b .131	29.022
	May...	3	4.2	a 19.72	a 53.55	b 76	a 3.91	2.44	9.24	b 52	4.08	4.58	b 9.2	b .798	b .183	29.035
	Nov...	2	3.6	14.20	36.06	80	2.38	1.49	10.19	71	b 3.34	b 3.77	11.2	1.099	.281	29.073
	Feb...	0.3	3.0	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Apr...	0.3	1.0	a 18.74	43.93	b 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	a 29.100
	Dec...	0.3	2.0	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Mar...	0.2	2.0	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Jan....	0	0	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	a 29.076

*. †. ‡. §. ||. ¶. **. For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Diarrhea and Cholera Infantum, on page 137.

b An exception to Proposition 2, relating to Diarrhea and Cholera Infantum, on page 137.

EXHIBIT XX.—*By Year and Months for 1897 and for the preceding year, and an average for the twenty years, 1877-96; also for the eleven years, 1886-96; Stating on what Per Cent of the Weekly Reports received DIARRHEA, CHOLERA INFANTUM, INTERMITTENT FEVER, REMITTENT FEVER, TYPHOID FEVER, TYPHO-MALARIAL FEVER, MEASLES, WHOOPING-COUGH, CHOLERA MORBUS AND DYSENTERY were Reported Present, and comparing the Per Cents for 1897, with the Averages for Corresponding Months in those years.**

Years, etc.		Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.													Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Diarrhea.	Av. 20 years, 1877-1896	45	27	27	29	30	33	42	68	82	77	53	33	26	Cholera Infantum.	12	12	2	1	2	2	3	9	28	43	34	12	3	2										
	Av. 11 years, 1886-1896	43	27	27	28	29	31	39	63	78	73	50	30	25			11	2	1	1	1	3	9	25	39	32	11	3	2										
	1896	34	24	23	22	19	23	37	56	65	58	36	23	15			8	1	0	7	1	4	9	20	29	18	4	1	1										
	1897	34	14	19	19	20	24	27	46	63	66	58	34	22			8	0	0	3	0	3	5	16	22	27	17	2	0	3									
	In 1897 Greater than Av. 1877-1896.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—							
	In 1897 Less than Av. 1877-1896.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
	In 1897 Greater than Av. 1886-1896†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
	In 1897 Less than Av. 1886-1896†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	1896-96†	9	13	8	9	9	7	12	17	15	7	—	—	—			3	2	0	7	0	8	0	7	—	—	—	—	—	—	—	—	—	—	—				
Intermittent Fever.	Av. 20 years, 1877-1896	53	43	43	46	53	56	57	60	60	59	57	51	44	Remittent Fever.	36	30	29	31	33	34	36	38	44	46	44	37	32											
	Av. 11 years, 1886-1896	35	29	28	31	36	36	37	40	41	39	38	33	28			25	22	21	21	22	23	24	26	31	32	27	23											
	1896	19	14	13	13	21	23	23	24	23	23	22	17	15			16	21	15	15	10	14	15	17	22	20	17	15	14										
	1897	17	12	12	10	14	13	18	17	24	28	24	19	12			11	10	9	9	11	11	13	16	15	16	13	10	5										
	In 1897 Greater than Av. 1877-1896.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1877-96.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Greater than Av. 1886-1896†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1886-96†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	1896-96†	18	17	16	21	22	23	19	23	17	11	14	14	16			14	12	12	12	12	11	12	11	10	16	16	19	17	18									
Typhoid Fever.	Av. 20 years, 1877-1896	11	9	7	5	5	4	5	7	14	20	22	19	13	Typho-Malarial Fever.	15	11	10	9	8	8	8	11	18	28	29	21	14											
	Av. 11 years, 1886-1896	10	7	5	4	3	4	5	7	14	19	21	16	11			9	6	5	5	5	5	4	6	12	16	17	11	7										
	1896	10	10	10	3	3	3	6	9	16	24	17	11	4			2	0	8	0	3	0	7	0	4	1	0	6	2	1									
	1897	7	3	5	3	0	9	3	5	7	12	10	14	12			0	9	0	0	3	0	7	0	3	0	9	0	7	2	0	0	8						
	In 1897 Greater than Av. 1877-1896.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1877-96.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Greater than Av. 1886-1896†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1886-96†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	1896-96†	3	4	—	1	2	1	1	—	3	2	9	7	4			4	8	1	6	4	7	4	1	3	3	4	8	14	17	11	6	2						
Measles.	Av. 20 years, 1877-1896	11	9	12	15	19	22	18	11	5	4	3	5	6	Whooping-cough.	15	15	15	15	14	15	15	18	17	16	13	14	14											
	Av. 11 years, 1886-1896	8	7	11	13	15	18	15	8	3	2	2	3	5			11	10	11	11	12	12	12	14	13	12	9	9											
	1896	7	2	7	11	10	17	14	9	2	1	2	3	4			7	8	9	9	8	7	11	8	4	5	5	2	2										
	1897	13	8	12	17	24	32	25	12	8	4	3	7	9			4	3	2	2	3	5	4	9	8	5	4	5	3										
	In 1897 Greater than Av. 1877-1896.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1877-96.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Greater than Av. 1886-1896†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1886-96†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	1896-96†	5	1	1	4	9	14	10	4	5	2	1	4	4			7	7	9	9	9	7	8	5	5	7	5	4	6										
Cholera Morbus.	Av. 20 years, 1877-1896	17	4	4	4	5	7	16	40	51	37	14	6	4	Dysentery.	17	7	6	7	7	8	12	27	48	44	23	10	6											
	Av. 11 years, 1886-1896	15	3	3	3	4	7	15	34	47	35	12	5	4			15	6	6	6	6	7	10	22	42	40	21	9	5										
	1896	11	3	2	2	3	7	16	27	36	21	6	4	4			11	4	4	3	6	5	11	21	33	24	13	3	3										
	1897	10	1	3	3	4	3	6	20	27	28	21	5	1			12	4	4	6	4	6	6	10	24	30	29	9	7										
	In 1897 Greater than Av. 1877-1896.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1877-96.	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Greater than Av. 1886-1896†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	In 1897 Less than Av. 1886-96†	—	—	—	—	—	—	—	—	—	—	—	—	—			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—					
	1896-96†	5	2	—	—	—	—	4	9	14	20	7	—	—			3	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				

* Other statements for 1897, and months in 1897, relative to these diseases are given in Table 2, and in Exhibits XIX., XXI., XXII., XXIII. and XXIV., where are also given for convenient comparison statements of coincident meteorological conditions. The lines for 1897 are graphically represented in Diagrams 1, 3 and 5 in this article.

† This comparison is made because of change of plan of reports in May, 1885, as explained on page 82.

DIAGRAM 5—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1897.

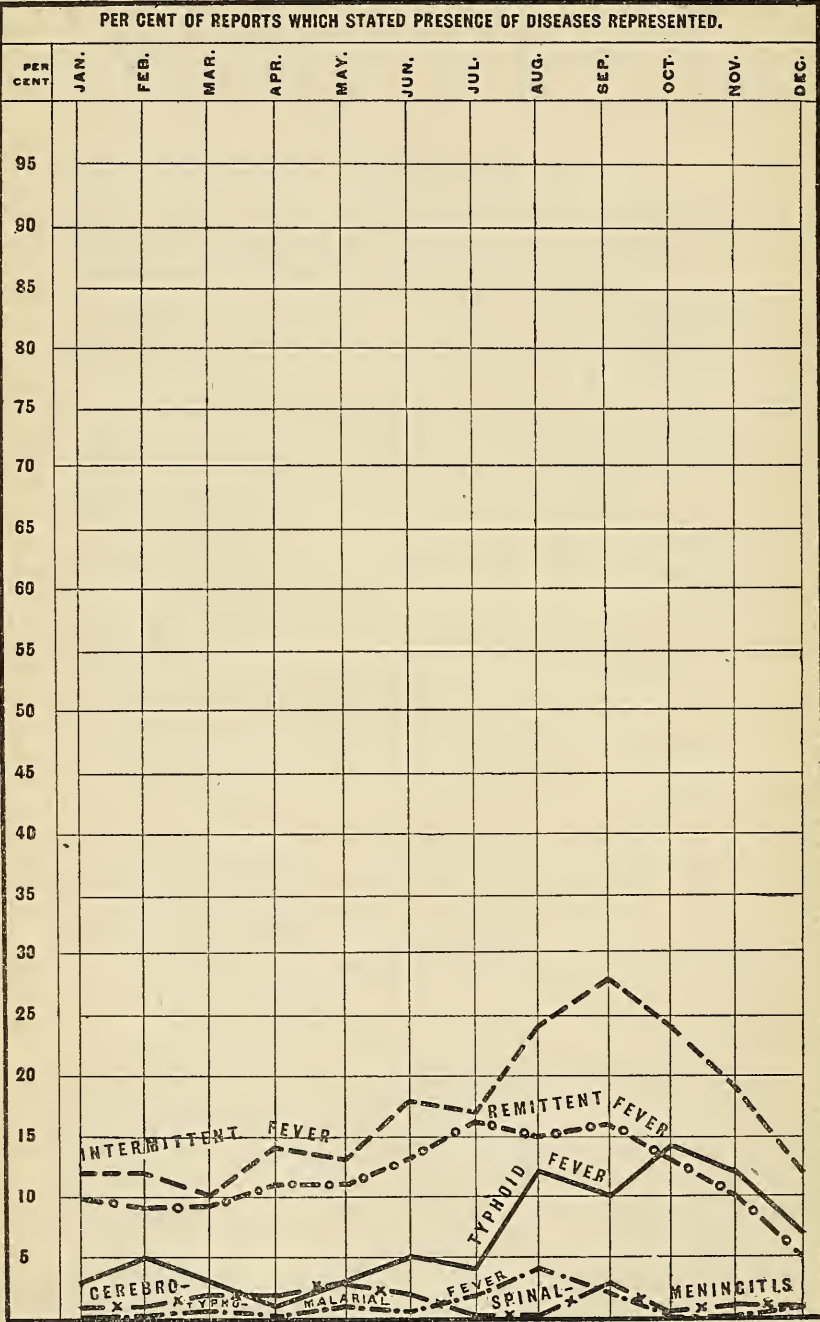


EXHIBIT XXI.—INTERMITTENT FEVER AND REMITTENT FEVER.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Intermittent Fever and Remittent Fever and what were the Meteorological Conditions as Observed at Stations in Michigan.**

INTERMITTENT FEVER.			Temperature. F.		Humidity of Air, % Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative, Scale of 10°.		Per Hour by Anemometer.		Atmospheric Pressure, Inches. Reduced to 32° F.									
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.													Per Cent of Weekly Reports Stating Presence of.		Av. Order of Prevalence where Present.†, ‡.		Av. Daily Range by Registering Thermometers.		Average of Three Daily Observations.		Range.	
																					Monthly and for Year.	Av. Daily, by 3 Daily Observations.**	Average Pressure.
More than Av. Per Cent of Intermittent Fever.	{	Sept.	28	2.3	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215					
		Aug.	24	2.1	20.60	65.59	77	5.61	3.51	8.17	40	3.96	4.32	7.7	.670	.128	29.047					
		Oct.	24	2.7	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	1.039	.215	29.127					
		Nov.	19	2.8	14.20	36.06	80	2.38	1.49	10.19	71	3.34	3.77	11.2	1.099	.281	29.073					
		June.	18	2.9	20.77	63.07	76	5.26	3.29	8.39	48	3.73	4.23	7.9	.521	.131	29.022					
Average. . .			17	2.7	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073					
Less than Av. Per Cent of Intermittent Fever.	{	July . . .	17	2.2	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	29.000					
		Apr. . . .	14	3.3	18.74	43.93	77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	29.100					
		May . . .	13	2.7	19.72	53.55	76	3.91	2.44	9.24	52	4.08	4.58	9.2	.798	.183	29.035					
		Jan. . . .	12	3.4	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	29.076					
		Feb. . . .	12	3.3	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069					
		Dec. . . .	12	2.3	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045					
			10	3.4	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063					
REMITTENT FEVER.																						
More than Av. Per Cent of Remittent Fever.	{	July . . .	16	2.8	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	29.000					
		Sept.	16	2.9	23.30	64.22	77	5.18	3.24	8.44	39	2.64	3.04	7.5	.668	.152	29.215					
		Aug.	15	3.0	20.60	65.59	77	5.61	3.51	8.17	40	3.96	4.32	7.7	.670	.128	29.047					
		June.	13	3.3	20.77	63.07	76	5.26	3.29	8.39	48	3.73	4.23	7.9	.521	.131	29.022					
		Oct.	13	2.9	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	1.039	.215	29.127					
Average. . . .			11	3.2	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073					
Less than Av. Per Cent of Remittent Fever.	{	Apr. . . .	11	3.4	18.74	43.93	77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.009	.241	29.100					
		May . . .	11	3.5	19.72	53.55	76	3.91	2.44	9.24	52	4.08	4.58	9.2	.798	.183	29.035					
		Jan. . . .	10	3.4	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	29.076					
		Nov. . . .	10	3.2	14.20	36.06	80	2.38	1.49	10.19	71	3.34	3.77	11.2	1.099	.281	29.073					
		Feb. . . .	9	3.5	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069					
		Mar. . . .	9	3.6	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063					
		Dec. . . .	5	3.3	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045					

*, †, ‡, §, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Intermittent Fever and Remittent Fever, on page 137.

b An exception to Proposition 2, relating to Intermittent Fever and Remittent Fever, on page 137.

EXHIBIT XXII.—TYPHOID FEVER AND TYPHO-MALARIAL FEVER.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Typhoid Fever and Typho-Malarial Fever and what were the Meteorological Conditions as Observed at Stations in Michigan.**

TYPHOID FEVER.				Tempera- ture. F.		Humidity of Air, Av. of 3 Daily Ob- servations.		Vapor Inhaled and Exhaled from the Air Passages by one Per- son in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		Atmospheric Pres- sure, Inches. Reduced to 32° F.				
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of. Av. Order of Prevalence where Present. †, ‡	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled. ||	Exhaled in ex- cess of that inhaled. ¶	Average Per Cent of Cloudiness.	Ozone, Relative. Scale of 10°.		Av. Velocity of Wind, Miles per Hour by Anemometer.	Range		Average Pressure.		
									Day Observation, 7 A. M. to 9 P. M.	Night Observation, 9 P. M. to 7 A. M.		Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions. **			
More than Av. Per Cent of Typhoid Fever.	{ Oct.	14	2.8	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	b 1.039	b .215	29.127
	{ Aug.	12	3.2	20.60	65.59	77	5.61	3.51	8.17	40	b 3.96	b 4.32	7.7	.670	.128	a 29.047
	{ Nov.	12	3.3	a 14.20	a 36.06	b 80	a 2.38	1.49	10.19	b 71	3.34	3.77	b 11.2	b 1.099	b .281	29.073
	{ Sept.	10	3.1	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
Av.		7	3.3	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Typhoid Fever.	{ Dec.	7	3.2	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	{ Feb.	5	3.8	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	{ June	5	4.1	a 20.77	a 63.07	b 76	a 5.26	3.29	8.39	b 48	3.73	4.23	b 7.9	b .521	b .131	59.022
	{ July	4	3.3	a 19.89	a 73.28	b 76	a 6.85	4.28	7.40	b 40	b 3.02	b 3.67	b 7.3	b .491	b .094	29.000
	{ Jan.	3	2.6	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	a 29.076
	{ Mar.	3	4.1	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	{ May	3	4.3	a 19.72	a 53.55	b 76	a 3.91	2.44	9.24	b 52	4.08	4.58	b 9.2	b .798	b .183	29.035
Apr.		0.9	3.0	a 18.74	43.93	b 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	a 29.100
TYPHO-MAL FEVER.																
More than Av. Per Ct. of Typho- Mal. Fev.	{ Aug.	4	3.0	20.60	65.59	77	5.61	3.51	8.17	40	b 3.96	b 4.32	7.7	.670	.128	a 29.047
	{ July	2	2.8	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	a 29.000
	{ Sept.	2	3.0	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
Av.		0.9	2.7	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Typho-Malarial Fever.	{ May	0.9	3.3	a 19.72	a 53.55	b 76	a 3.91	2.44	9.24	b 52	4.08	4.58	b 9.2	b .798	b .183	29.035
	{ Dec.	0.8	2.0	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	{ Mar.	0.7	2.0	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	{ June	0.7	1.7	a 20.77	a 63.07	b 76	a 5.26	3.29	8.39	b 48	3.73	4.23	b 7.9	b .521	b .131	29.022
	{ Feb.	0.3	4.0	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	{ Apr.	0.3	3.0	a 18.74	43.93	b 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	a 29.100
	{ Jan.	0	0	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	a 29.076
	{ Oct.	0	0	a 19.82	a 53.45	b 77	a 3.89	2.43	9.25	b 46	b 2.97	b 3.17	b 8.6	1.039	.215	a 29.127
	{ Nov.	0	0	14.20	36.06	80	2.38	1.49	10.19	71	b 3.34	b 3.77	11.2	1.099	.281	29.073

* †, ‡, §, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Typhoid Fever and Typho-Malarial Fever, on page 137.

b An exception to Proposition 2, relating to Typhoid Fever and Typho-Malarial Fever, on page 137.

EXHIBIT XXIII.—MEASLES AND WHOOPING-COUGH.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Measles and Whooping-Cough and what were the Meteorological Conditions as Observed at Stations in Michigan.**

MEASLES.				Tempera- ture. F.		Humidity of Air. Av. of 3 Daily Ob- servations		Vapor Inhaled and Exhaled from the Air Passages by one per- son in 24 Hours, Troy Ounces.		Ozone. Relative. Scale of 10°.		Atmospheric Pres- sure, Inches. Reduced to 32° F.				
Months in Order of Great- est Per Cent of Weekly Reports Stating Pres- ence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present. †, ‡	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute—Grains of Vapor in a Cubic Foot of Air.	Inhaled. ||		Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.			
							Inhaled. ||	Exhaled in ex- cess of that Inhaled. ¶					Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions. §§		
More than Av. Per Cent of Measles.	May ..	32	2.0	19.72	53.55	76	3.91	2.44	9.24	52	b 4.08	b 4.58	9.2	.798	.183 a	29.035
	June..	25	2.0	20.77	63.07	76	5.26	3.29	8.39	48	b 3.73	b 4.23	7.9	.521	.131 a	29.022
	Apr. . .	24	2.2	18.74	a43.93	77	a 2.93	1.83	9.85	b 60	b 3.79	b 4.26	b 11.0	b 1.109	b .241	29.100
	Mar. . .	17	2.2	a16.73	a31.86	b 81	a 2.00	1.25	10.43	b 62	b 4.13	b 4.73	b 10.9	b 1.394	b .366 a	29.063
	Av.	13	2.3	17.82	48.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Average Per Cent of Measles.	Feb. . . .	12	2.6	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	July . . .	12	2.7	a19.89	a73.28	b 76	a 6.85	4.28	7.40	b 40	b 3.02	b 3.67	b 7.3	b .491	b .094	29.000
	Dec. . . .	9	2.6	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Jan. . . .	8	2.4	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247 a	29.076
	Aug. . . .	8	2.3	a20.60	a65.59	b 77	a 5.61	3.51	8.17	b 40	3.96	4.32	b 7.7	b .670	b .128	29.047
	Nov. . . .	7	2.7	14.20	36.06	80	2.38	1.49	10.19	71	b 3.34	b 3.77	11.2	1.099	.281	29.073
	Sept. . .	4	3.0	a23.30	a64.22	b 77	a 5.18	3.24	8.44	b 30	b 2.64	b 3.04	b 7.5	b .668	b .152 a	29.215
	Oct. . . .	3	2.2	a19.82	a53.45	b 77	a 3.89	2.43	9.25	b 46	b 2.97	b 3.17	b 8.6	1.039	.215 a	29.127
WHOOPI- NG-COUGH.																
More than Av. Per Cent of Whooping-Cough.	July ..	9	2.1	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094 a	29.000
	Aug. . .	8	2.1	20.60	65.59	77	5.61	3.51	8.17	40	b 3.96	b 4.32	7.7	.670	.128 a	29.047
	Sept. . .	5	1.7	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	May ..	5	1.9	19.72	53.55	76	3.91	2.44	9.24	52	b 4.08	b 4.58	9.2	.798	.183 a	29.035
	Nov. . .	5	1.8	a14.20	a36.06	b 80	a 2.38	1.49	10.19	b 71	3.34	3.77	b 11.2	b 1.099	b .281	29.073
Av.	4	2.1	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073	
Less than Av. Per Cent of Whooping-Cough.	June . . .	4	2.7	a20.77	a63.07	b 76	a 5.26	3.29	8.39	b 48	3.73	4.23	b 7.9	b .521	b .131	29.022
	Oct. . . .	4	2.3	a19.82	a53.45	b 77	a 3.89	2.43	9.25	b 46	b 2.97	b 3.17	b 8.6	1.039	.215 a	29.127
	Jan. . . .	3	1.7	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247 a	29.076
	Apr. . . .	3	2.4	a18.74	43.93	b 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241 a	29.100
	Dec. . . .	3	2.0	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Feb. . . .	2	1.3	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Mar. . . .	2	2.2	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063

*. †. ‡. §. ||. ¶. §§. For foot-notes with these marks, see Exhibit X.

† An exception to Proposition 1, relating to Measles and Whooping-Cough, on page 137.

‡ An exception to Proposition 2, relating to Measles and Whooping-Cough, on page 137.

EXHIBIT XXIV.—CHOLERA MORBUS AND DYSENTERY.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Cholera Morbus and Dysentery and what were the Meteorological Conditions as Observed at Stations in Michigan.**

CHOLERA MORBUS.			Tempera- ture. F°.		Humidity of Air, g Av. of 3 Daily Observations.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone, Relative. Scale of 10°.		Atmospheric Pres- sure, Inches. Reduced to 32° F.					
Months in Order of Great- est Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Re- ports Stating Presence of.	Av. Order of Prevalence where Present. †, ‡.	Av. Daily Range by Reg- istering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute — Grains of Vapor in a Cu- bic Foot of Air.	Inhaled. ||	Exhaled in Ex- cess of that Inhaled. ¶	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.	
													Monthly and for Year.	Av. Daily, by 3 Daily Observa- tions. **		
More than Av. Per Ct. of Chol- era Morbus.	Sept.	28	2.9	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	Aug.	27	2.8	20.60	65.59	77	5.61	3.51	8.17	40	b 3.96	b 4.32	7.7	.670	.128	a 29.047
	Oct.	21	3.0	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	b 1.039	b .215	29.127
	July	20	2.7	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	a 29.000
	Av.	19	3.0	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Cholera Morbus.	June.	6	3.5	a 20.77	a 63.07	b 76	a 5.26	3.29	8.39	b 48	3.73	4.23	b 7.9	b .521	b .131	29.022
	Nov.	5	3.2	14.20	36.06	80	2.38	1.49	10.19	71	b 3.34	b 3.77	11.2	1.099	.281	29.073
	Apr.	4	3.6	a 18.74	43.93	b 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	a 29.100
	May	3	3.6	a 19.72	a 53.55	b 76	a 3.91	2.44	9.24	b 52	4.08	4.58	b 9.2	b .798	b .183	29.035
	Feb.	3	4.3	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Mar.	3	3.6	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Jan.	1	3.5	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	a 29.076
	Dec.	1	1.6	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
DYSENTERY.																
More than Av. Per Cent of Dysentery.	Sept.	30	2.8	23.30	64.22	77	5.18	3.24	8.44	30	2.64	3.04	7.5	.668	.152	29.215
	Oct.	29	3.0	19.82	53.45	77	3.89	2.43	9.25	46	2.97	3.17	8.6	b 1.039	b .215	29.127
	Aug.	24	3.2	20.60	65.59	77	5.61	3.51	8.17	40	b 3.96	b 4.32	7.7	.670	.128	a 29.047
	July	16	3.2	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.094	a 29.000
	Av.	12	3.2	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Av. Per Cent of Dysentery.	Nov.	9	3.2	14.20	36.06	80	2.38	1.49	10.19	71	b 3.34	b 3.77	11.2	1.099	.281	29.073
	Dec.	7	3.5	13.15	25.75	83	1.71	1.07	10.61	82	3.73	4.41	10.1	1.070	.267	29.045
	Mar.	6	3.4	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	May	6	2.6	a 19.72	a 53.55	b 76	a 3.91	2.44	9.24	b 52	4.08	4.58	b 9.2	b .798	b .183	29.035
	June.	6	3.4	a 20.77	a 63.07	b 76	a 5.26	3.29	8.39	b 48	3.73	4.23	b 7.9	b .521	b .131	29.022
	Jan.	4	3.4	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	a 29.076
	Feb.	4	4.3	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Apr.	4	4.7	a 18.74	43.93	b 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	a 29.100

* †, ‡, §, ||, ¶, **. For foot-notes with these marks, see Exhibit X.

‡ An exception to Proposition 1, relating to Cholera Morbus and Dysentery, on page 137.

¶ An exception to Proposition 2, relating to Cholera Morbus and Dysentery, on page 137.

COLD-WEATHER DISEASES.

EXHIBIT XXV.—*Summary relative to Propositions contained in Exhibits X., XII., XIV., XV., XVI., etc., concerning Relations by Months, in 1897, between Greater or Less than Usual Prevalence of Diseases Named, and Certain given Coincident Climatic Conditions.*

Diseases.	Months (inclusive) in which Diseases named were more than Usually Prevalent in 1897.	Months (inclusive) in which Diseases named were less than Usually Prevalent in 1897.	For the 12 months of the year 1897. Number of Months in which Proposition hold true.*												
			That in Months when Diseases named were more than usually prevalent the conditions named below were Greater than usual, and in Months when Less than usually prevalent these condi- tions were Less than usual.†								That in Mos. when Diseases named were more than usually preva- lent the condi- tions named be- low were Lower than usual, and in Mos. when the Diseases were Less than usually preva- lent these condi- tions were higher than usual.†				
			Relative Humidity.	Av. Per Cent of Cloudiness.		Ozone.		Velocity of Wind.	Atmos- pheric Pressure.		Average Temperature.	Av. Daily Range of Temp.†		Av. Daily Atmospheric Pres- sure.†	Absolute Humidity.
				Day.	Night.	Monthly.	Av. Daily.		Range.						
Bronchitis.....	Jan.-Apr., Dec.	May-Nov.....	10	11	9	9	11	10	10	11	10	6	11		
Pneumonia.....	Jan.-May, Dec.	June-Nov.....	9	10	10	10	10	9	9	10	9	7	10		
Membran. croup...	Jan., Mar., May, Nov., Dec.	Feb., Apr., June- Oct.	10	9	7	7	9	8	8	9	10	7	9		
Diphtheria	Jan., Feb., Oct.- Dec.	Mar.-Sept.....	10	9	5	5	9	10	10	9	10	5	9		
Tonsillitis.....	Jan.-May, Nov., Dec.	June-Oct.....	10	11	9	9	11	10	10	11	10	7	11		
Influenza.....	Jan.-Apr., Dec.	May-Nov.....	10	11	9	9	11	10	10	11	10	6	11		
Scarlet fever.....	Feb., Apr., June, Nov., Dec.	Jan., Mar., May, July-Oct.	8	9	7	7	9	8	8	9	8	7	9		
Rheumatism	Jan., June, July, Sept., Nov.	Feb.-May, Aug., Oct., Dec.	6	5	3	3	5	4	4	5	6	5	5		
Neuralgia.....	Jan., Mar.-May, Nov., Dec.	Feb., June-Oct.	9	10	8	8	10	9	9	10	9	6	10		
Consumption, pul.	Jan., Mar.-Aug.	Feb., Sept.-Dec.	4	5	9	9	5	4	4	5	4	8	5		
Pleuritis	Jan.-May, Dec.	June-Nov.....	9	10	10	10	10	9	9	10	9	7	10		
Average disease...	Jan.-Apr., Aug.- Oct.	May-July, Nov., Dec.	6	7	7	7	7	8	8	7	6	4	7		

* The figures in each of these 11 columns show for how many months out of the twelve months in 1897, the proposition named over the column holds true thus, concerning bronchitis, the proposition relative to average daily range of temperature held true in ten months out of the twelve; that relative to average temperature, in eleven out of twelve, etc.

† The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893, Annual Report for 1894. These propositions are printed on preceding pages of this Report, under the heading "Climate and Sickness."

WARM-WEATHER DISEASES.

EXHIBIT XXVI.—*Summary Relative to Propositions contained in Exhibits XIX., XXI., etc., concerning Relations, by Months in 1897, between Greater or Less than Usual Prevalence of Diseases Named, and Certain given Coincident Climatic Conditions.*

Diseases.	Months (inclusive) in which Diseases named were more than Usually Prevalent in 1897.	Months (inclusive) in which Diseases named were less than Usually Prevalent in 1897.	For the 12 Months of the Year 1897. Number of Months in which Propositions hold true.*											
			That in Months when Diseases named were More Prevalent than Usual, the Condi- tions named be- low were Higher than Usual; and in Months when the Diseases were less Prevalent than Usual, these Conditions were lower than Usual.	That in Months when Diseases named were More Prevalent than Usual, the Conditions named below were Less than Usual; and in Months when the Diseases were less Prevalent than Usual, these Conditions were Greater than Usual.										
				Average Temperature.	Av. Daily Range of Temp.	Absolute Humidity.	Av. Daily Atmospheric Pressure.	Atmos- pheric Pressure.		Relative Humidity.	Av. Per Cent of Cloudiness.	Ozone.		Velocity of Wind.
								Range.				Day.	Night.	
								Monthly.	Av. Daily.					
Diarrhea.....	July-Oct.....	Jan.-June, Nov., Dec.	10	9	10	8	9	9	9	10	10	10	11	
Cholera Infantum.	July-Oct.....	Jan.-June, Nov., Dec.	10	9	10	8	9	9	9	10	10	10	10	
Intermittent fever	June, Aug.-Nov.	Jan.-May, July, Dec.	9	8	9	8	8	8	8	9	9	9	9	
Remittent fever...	June-Oct.....	Jan.-May, Nov., Dec.	11	10	11	7	10	10	10	11	9	9	11	
Typhoid fev. (ent.)	Aug.-Nov.....	Jan.-July, Dec..	8	7	8	9	7	7	7	8	10	10	8	
Typho-mal. fever..	July-Sept.	Jan.-June, Oct.- Dec.	9	8	9	7	10	10	8	9	9	9	9	
Measles.....	Mar.-June.....	Jan., Feb., July- Dec.	6	7	6	6	7	7	7	6	4	4	6	
Whooping-cough...	May, July-Sept. Nov.	Jan.-Apr., June, Oct., Dec.	9	8	9	6	10	10	8	9	9	9	9	
Cholera morbus...	July-Oct.....	Jan.-June, Nov. Dec.	10	9	10	8	9	9	9	10	10	10	10	
Dysentery.....	July-Oct.....	Jan.-June, Nov., Dec.	10	9	10	8	9	9	9	10	10	10	10	

* The figures in each of these 11 columns show for how many months out of the twelve months in 1897 the proposition named over the column holds true; thus, concerning diarrhea, the proposition relative to average daily range of temperature held true in nine months out of the twelve; that relative to absolute humidity ten months out of the twelve, etc.

TOTAL SICKNESS—AVERAGE DISEASE.

"Average disease" is an average of the tabulated diseases reported present on all the cards received and compiled at this office during the year. It is probably equivalent to the actual sickness from all diseases printed on the report cards, and probably represents very nearly the average sickness from all the diseases in the State. A sample of the report cards on which diseases are reported to this office is shown on the third page of this Article. Twenty-eight diseases are printed on the cards. In 1897 there were 4,418 of these card reports received. On some of the

cards only one or two diseases were reported present and on others more. Had each disease (printed on this card, and only the twenty-eight thus named) been reported present on every card received at this office, there would have been 123,704 reports of diseases present. (This is the product of 4,418 reports received multiplied by 28, the number of diseases printed on the cards, or 100 per cent of the possible disease reports.) There were actually present on the cards received at this office only 21,828 disease reports, which $21,828 \div 123,704$ of the possible disease reports that might have been present, is about 18 per cent. This 18 per cent represents the actual sickness in the State from the tabulated diseases reported present, or in other words the sickness from "average disease." (See Diagram 4, on a preceding page.)

Exhibit XXVII. serves to indicate the probable actual sickness in the State from the tabulated diseases in each year from 1877 to 1897. It compares the sickness in 1897 by months with the sickness by months in each of the twenty years, 1877-1896. It also compares the sickness by months in 1897, with the sickness, by months, in each of the eleven years, 1886-1896. This last comparison is made because of the change in the plan of reports, which occurred in May, 1885, since which time the plan has been to have reported only the sickness actually observed by the physician who reports, thus placing the sickness statistics upon a scientific basis. Previous to May, 1885, some reported sickness that, by conference with other physicians, they believed to have occurred.

By Exhibit XXVII., it will be seen that the sickness reported in 1897, was, for the year, and for each month of the year, considerably less than the average reported for the twenty years, 1877-1896, and less than the average for the eleven years, 1886-1896.

On this subject Exhibits A and B, on preceding pages, and the accompanying remarks, may be studied in connection with the exhibits and remarks in this part of this article. In Exhibit A, the order of prevalence of each disease, including the "Average Disease," is shown as it appears after taking account of the order or prevalence of each disease in the places where it was present, and also the per cent of all reports received on which that disease was reported.

RELATIONS OF TOTAL AMOUNT OF SICKNESS TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the 28 diseases tabulated (in Tables 1 to 4 inclusive on preceding pages) as were reported present, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **less** than the average for the year. In Exhibit XXVIII., the letter *a* marks exceptions to this proposition for the year 1897.

EXHIBIT XXVII.—SICKNESS FROM AVERAGE DISEASE, 1877-97.—*By year and Months for each of the twenty-one Years, 1877-1897, Stating on an average for such of the 28 diseases tabulated as were reported present, what Per Cent of the Weekly Reports received stated presence of the Diseases, and Comparing the Average Per Cents for Months in 1897 with the Averages for Corresponding Months in the twenty years, 1877-96; also comparing the Averages for the months in 1897 with the Averages for corresponding months in the eleven Years, 1886-96.**

Years, etc.	Annual Av.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Average 20 years, 1877-96.....	26	27	27	27	27	25	24	25	28	28	27	25	26
Average 11 years, 1886-96.....	22	23	24	24	23	22	20	22	24	24	22	21	22
1877.....	28	27	28	26	24	24	23	26	29	31	30	30	30
1878.....	30	30	30	31	29	28	26	28	32	35	34	30	32
1879.....	33	35	36	36	35	30	30	32	37	36	34	34	33
1880.....	32	32	32	32	31	30	31	34	36	35	32	30	31
1881.....	33	34	34	32	35	31	30	34	37	36	35	32	31
1882.....	30	31	30	30	30	29	28	28	30	34	32	31	29
1883.....	30	30	31	33	33	31	29	29	32	32	29	29	28
1884.....	29	28	29	30	28	28	29	31	34	34	33	30	29
1885.....	26	29	29	30	28	25	24	26	27	27	26	26	26
1886.....	26	26	26	28	27	26	23	26	27	28	25	25	25
1887.....	25	26	27	28	26	25	24	27	29	26	25	24	24
1888.....	24	24	26	27	26	24	23	22	25	25	23	22	23
1889.....	23	23	22	24	23	23	21	24	27	28	26	23	22
1890.....	25	26	26	25	26	25	23	24	27	26	25	25	27
1891.....	25	27	27	27	27	25	22	23	26	25	24	23	24
1892.....	21	26	25	24	24	20	19	19	22	23	22	20	23
1893.....	20	21	21	20	20	19	18	18	21	21	20	20	20
1894.....	20	20	19	20	20	19	18	18	20	22	20	19	19
1895.....	20	20	21	22	22	19	18	19	20	19	19	17	18
1896.....	18	19	19	20	17	16	16	17	18	18	17	17	17
1897.....	18	18	18	19	18	17	16	17	18	19	19	17	16
In 1897 Less than Average 1877-1896.....	9	9	9	8	9	8	8	8	10	9	8	8	10
In 1897 Less than Average 1886-96*.....	5	5	6	5	5	5	4	5	6	5	3	4	6

* This last comparison is made because of the change in the plan of making the reports, which occurred in May, 1885, as explained on page 84.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the twenty-eight diseases tabulated as were reported present, the average daily temperature, the average daily range of temperature†, the absolute humidity of the atmos-

† The statements relative to the average daily range of temperature and the average daily pressure of the atmosphere were taken from Proposition 1 and inserted in Proposition 2 in the statistical study of sickness in Michigan in 1893. Annual Report for 1894.

phere, and the average daily pressure of the atmosphere††, were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **greater** than the average for the year. In Exhibit XXVIII., shown below, the letter *b* marks exceptions to this proposition for the year 1897.

What per cent of the weekly reports received in 1897 (on an average for such of the tabulated diseases as were reported present) stated presence of the diseases is graphically represented by months in Diagram 4.

Exhibit XXVIII., continued for a series of years, should show what meteorological conditions are on the whole most conducive to health in Michigan, and what are most to be guarded against by residents of Michigan.

EXHIBIT XXVIII.—AVERAGE DISEASE.—*Stating for the Year and for each Month of the Year 1897, what Per Cent of the Weekly Reports of Sickness Stated Presence of Average Disease and what were the Meteorological Conditions as observed at Stations in Michigan.**

AVERAGE DISEASE.			Temperature, F.		Humidity of Air, % of Saturation.		Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces.		Ozone. Relative. Scale of 10°		Atmospheric Pressure, Inches. Reduced to 32° F.					
Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of.	Per Cent of Weekly Reports Stating Presence of.	Av. Order of Prevalence where present,†, ‡	Av. Daily Range by Registering Thermometers.	Average of Three Daily Observations.	Relative Per Cent of Saturation.	Absolute, —Grains of Vapor in a Cubic Foot of Air.	Inhaled. ||	Exhaled in excess of that inhaled. ¶	Average Per Cent of Cloudiness.	Day Observation, 7 A. M. to 2 P. M.	Night Observation, 9 P. M. to 7 A. M.	Av. Velocity of Wind, Miles per Hour by Anemometer.	Range.		Average Pressure.	
													Av. Daily, by 3 Daily Observations. **			
More than Av. Per Cent of Average Disease.	Mar.	19	2.8	16.73	31.86	81	2.00	1.25	10.43	62	4.13	4.73	10.9	1.394	.366	29.063
	Sept.	19	2.7	623.30	664.22	a 77	b5.18	3.24	8.44	a 30	a 2.64	a 3.04	a 7.5	a .668	a .152	b 29.215
	Oct.	19	2.8	619.82	653.45	a 77	b3.89	2.43	9.25	a 46	a 2.97	a 3.17	a 8.6	1.039	.215	b 29.127
	Jan.	18	2.7	14.11	22.40	83	1.57	.98	10.70	78	4.32	4.22	10.8	1.323	.247	b 29.076
	Feb.	18	2.8	12.78	25.64	82	1.58	.99	10.69	78	4.29	4.80	10.0	1.024	.234	29.069
	Apr.	18	2.9	618.74	43.93	a 77	2.93	1.83	9.85	60	3.79	4.26	11.0	1.109	.241	b 29.100
	Aug.	18	2.7	620.60	665.59	a 77	b5.61	3.51	8.17	a 40	3.96	4.32	a 7.7	a .670	a .128	29.047
Av.		17	2.7	17.82	46.57	78	3.57	2.23	9.45	57	3.67	4.10	9.4	.934	.212	29.073
Less than Average Per Cent of Av. Disease.	May ..	17	2.7	19.72	53.55	76	3.91	2.44	9.24	52	a 4.08	a 4.58	9.2	.798	.183	b 29.035
	July ..	17	2.6	19.89	73.28	76	6.85	4.28	7.40	40	3.02	3.67	7.3	.491	.034	b 29.000
	Nov. ...	17	2.7	614.20	636.06	a 80	b 2.38	1.49	10.19	a 71	3.34	3.77	a 11.2	a 1.099	a .281	29.073
	June ..	16	2.7	20.77	63.07	76	5.26	3.29	8.39	48	a 3.73	a 4.23	7.9	.521	.131	b 29.022
	Dec. ...	16	2.6	613.15	625.75	a 83	b 1.71	1.07	10.61	a 82	a 3.73	a 4.41	a 10.1	a 1.070	a .267	b 29.045

* †, ††, ‡, ‖, ¶, **, For foot-notes with these marks, see Exhibit X.

a An exception to Proposition 1, relating to Average Disease, on page 147.

b An exception to Proposition 2, relating to Average Disease, on page 148.

†† This foot-note is on the last preceding page.

COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1897.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE
BOARD OF HEALTH.

This paper continues a subject treated for the preceding year on pages 150-448 of the report of the State Board of Health for the year 1897, and for former years in previous reports.

Whenever information is received at this office of the outbreak (in any locality in Michigan) of diphtheria, scarlet fever, typhoid fever, consumption, smallpox, measles, German measles (rötheln), whooping-cough, rabies, or glanders, a letter is sent to the health officer of the township, city or village in which the disease is reported to be present (if the name of the health officer has been reported to this office; if not, to the president of the board of health), calling his attention (if the report was not received from him) to the reported existence of the disease within his territory, indicating his duties and powers and the proper measures to be taken in restricting the disease, transmitting documents of instruction with regard to prevention and restriction of the disease, for distribution among the neighbors of families in which the disease is present,* and asking for a report of the methods employed for the restriction of the disease, and the results of efforts for suppressing it, also the number of cases and deaths in each outbreak. In the case of typhoid fever, a printed letter was used (form [162.]) which is reproduced in Part I. of the report of this Board for 1894, p. lxxxvi. In the case of diphtheria, scarlet fever, and smallpox the letter generally sent during the year 1894 was substantially the same as that printed on pages 251-252 of the Report of the State Board of Health for the year 1884, except that about a dozen questions were added, and in the case of measles a slightly modified form of the same letter was used. With this letter in each instance, there was sent a blank

* It is believed that these documents distributed in this manner are doing great good; for the neighbors of the sick are sufficiently alarmed to read the documents, and are thus led to co-operate in stamping out the disease.

Some evidence of the value of this work may be seen further on, in the several articles to which this is an introduction, in tables which show the estimated number of outbreaks of, and cases of sickness from communicable diseases prevented, and lives saved by isolation and disinfection.

In the Reports of this Board (for the year 1895, pp. 153-174; for the year 1896, pp. 430-437; for the year 1897, pp. 410-421), in the introduction to the articles on the dangerous communicable diseases, are printed tables and diagrams which show the results of restrictive measures recommended by this Board.

TABLE 1.—Number of all places* in Michigan at which Communicable Diseases were reported present, also the number of new places† at which each disease was reported present each week in 1897.

Weeks ending Saturday—	Diphtheria.		Scarlet Fever.		Typhoid Fever.		Measles.		Whooping- cough.		Consump- tion.		Small- pox.	
	*Places.	New Places.	Places.	New Places.	Places.	New Places.	Places.	New Places.	Places.	New Places.	Places.	New Places.	Places.	New Places.
January.....	{ 9... 44 16... 49 23... 48 30... 47	{ 21 14 17 9	{ 41 41 40 29	{ 9 12 9 5	{ 25 28 26 24	{ 12 7 6 7	{ 26 33 34 43	{ 8 14 20 17	{ 20 21 20 18	{ 7 5 5 4	{ 203 209 194 176	{ 10 14 18 6	{ 0 0 0 0	{ 0 0 0 0
February.....	{ 6... 42 13... 33 20... 41 27... 34	{ 17 11 26 14	{ 26 25 26 28	{ 3 6 7 6	{ 16 19 20 21	{ 3 3 7 6	{ 51 44 53 63	{ 15 12 12 20	{ 15 12 11 14	{ 4 2 4 2	{ 161 165 172 176	{ 6 10 5 9	{ 0 0 0 0	{ 0 0 0 0
March.....	{ 6... 32 13... 24 20... 29 27... 28 3... 30	{ 10 7 9 7 8	{ 30 30 28 27 15	{ 7 5 7 7 1	{ 17 18 16 12 13	{ 4 5 8 3 5	{ 66 57 81 81 76	{ 20 14 24 16 23	{ 17 9 11 9 7	{ 5 5 2 1 2	{ 179 176 163 163 161	{ 9 6 4 4 4	{ 0 0 0 0 1	{ 0 0 0 0 0
April.....	{ 10... 23 17... 20 24... 20 1... 24	{ 9 3 4 6	{ 19 23 26 23	{ 7 5 10 5	{ 14 16 10 12	{ 7 3 7 3	{ 73 85 97 91	{ 13 25 33 23	{ 7 7 1 5	{ 0 2 1 0	{ 162 165 165 166	{ 6 3 6 3	{ 1 1 1 0	{ 1 0 0 0
May.....	{ 8... 22 15... 19 22... 27 29... 21	{ 12 6 10 9	{ 17 23 23 19	{ 4 8 6 8	{ 14 15 18 20	{ 9 3 8 8	{ 88 89 91 93	{ 21 19 23 23	{ 6 2 10 4	{ 1 2 4 4	{ 166 167 172 180	{ 3 4 2 13	{ 1 0 0 0	{ 0 0 0 0
June.....	{ 5... 27 12... 29 19... 27 26... 33	{ 6 4 4 13	{ 24 26 24 21	{ 5 9 6 4	{ 14 13 17 15	{ 0 3 6 5	{ 84 80 69 68	{ 22 17 18 14	{ 8 5 2 11	{ 2 1 2 5	{ 181 181 183 187	{ 15 7 5 5	{ 0 0 0 0	{ 0 0 0 0
July.....	{ 3... 40 10... 26 17... 28 24... 27 31... 26	{ 12 9 10 8 9	{ 24 24 22 17 15	{ 10 4 2 3 3	{ 11 10 12 16 19	{ 2 2 1 4 7	{ 67 55 61 44 39	{ 15 8 14 12 9	{ 11 12 18 16 8	{ 4 2 3 2 4	{ 189 188 190 190 191	{ 2 2 3 2 1	{ 0 0 0 0 0	{ 0 0 0 0 0
August.....	{ 7... 21 14... 16 21... 19 28... 19	{ 3 3 8 8	{ 12 14 13 15	{ 1 5 2 4	{ 18 29 31 38	{ 6 14 13 6	{ 35 33 27 21	{ 10 11 7 4	{ 14 10 10 12	{ 3 0 1 1	{ 193 191 191 191	{ 6 1 1 1	{ 0 0 0 0	{ 0 0 0 0
September...	{ 4... 17 11... 22 18... 31 25... 27 2... 27	{ 9 11 15 5 11	{ 14 16 14 15 21	{ 3 5 6 3 7	{ 37 46 42 50 65	{ 16 16 13 14 23	{ 15 14 15 11 8	{ 2 7 2 3 2	{ 11 9 5 3 3	{ 6 9 1 2 1	{ 190 187 184 177 172	{ 5 4 7 6 7	{ 0 0 0 0 0	{ 0 0 0 0 0
October.....	{ 9... 28 16... 30 23... 37 30... 35	{ 11 8 14 14	{ 27 26 32 30	{ 8 7 12 7	{ 59 50 63 66	{ 24 19 11 26	{ 12 10 14 15	{ 2 4 4 5	{ 4 1 6 7	{ 0 3 1 3	{ 173 174 173 173	{ 4 2 1 2	{ 0 0 0 1	{ 0 0 0 1
November...	{ 6... 31 13... 38 20... 41 27... 40	{ 9 11 12 22	{ 32 27 30 30	{ 7 7 7 6	{ 58 73 65 53	{ 25 15 19 13	{ 13 15 19 26	{ 5 4 3 5	{ 9 9 5 9	{ 2 2 1 11	{ 172 171 169 169	{ 2 1 1 0	{ 0 1 1 0	{ 0 0 0 0
December...	{ 4... 41 11... 49 18... 47 25... 33 1... 34	{ 9 18 12 13 9	{ 33 39 43 38 36	{ 9 13 13 7 9	{ 66 44 42 47 33	{ 6 7 7 8 4	{ 32 27 26 28 27	{ 14 9 5 5 4	{ 10 10 11 11 6	{ 4 3 1 6 1	{ 174 177 178 175 175	{ 2 5 5 1 1	{ 0 0 0 0 0	{ 0 0 0 0 0
Average number of places per week..	31	10	25	6	30	9	47	12	10	3	178	5	.2	.04

* The number of "Places" are copied from the weekly bulletins "Health in Michigan" issued every Wednesday, and include all places at which the several diseases were reported present up to and including Saturday of the calendar week for which each bulletin is issued. "New Places" are included in these numbers.

† The numbers in the first column, "Places," are compiled from the data in card-reports for the sickness statistics, the outbreak reports of communicable diseases, and the weekly reports of communicable diseases.

‡ The "New Places" are those from which the specified diseases were first reported during the calendar week specified in each bulletin. They are compiled from the same sources as are the numbers in the first column of this table and from newspaper reports. Neither of the columns of this table contain all the places at which, later, by the "final" and "annual" reports, the diseases were found to have been present.

form (L) for the notice of the first case of a dangerous communicable disease, and a blank form (M) for weekly reports during the continuance of the disease. After the outbreak was over, there was sent a blank form (K) or (O) for special final report. Blanks (L) and (M) now in use are substantially the same as those printed on pages 253-254 of the Report for 1884. The blank (K) for final report is printed on pages xiii-xiv of the Report of this Board for 1888; but the present blank is more complete. The blank (O) is for typhoid fever, and was first used in September, 1890. Since that date it has been modified; as at present used it is printed on pages 149-150 of the Report of this Board for 1895.

The information contained in the above-mentioned blanks and those supplied to health officers and clerks of townships, cities and villages, for their annual reports, when filled and returned to this office by the health officers of localities where dangerous communicable diseases have existed, together with other correspondence in regard to outbreaks of such diseases, are the bases on which the various statements made in this article are founded.

It is probable that every case of smallpox is reported to the Secretary of the State Board of Health; but that cannot yet be said of any other of the diseases in Table 1. Named in the order of most complete reports, probably these communicable diseases would be arranged as follows: Smallpox, scarlet fever, diphtheria, typhoid fever, measles, consumption.

Some of the Purposes of this Compilation.

The object in having the data contained in the various reports received at the office of the Secretary compiled, tabulated and published is twofold: First, that facts relative to the ways whereby dangerous communicable diseases are spread in Michigan, and how they are sometimes restricted, and other useful facts, may be submitted to the people of the State, knowledge of which, it is hoped, will enable them to avoid or combat such diseases; and second, by the collation of such data to aid in the progress of sanitary science, especially in as far as it bears on the study of the cause and prevention of dangerous communicable diseases in Michigan.

In furtherance of these objects, the attempt has been made in this as in previous reports to publish useful information relative to dangerous communicable diseases in this State, on the following points:—(1) The diseases which cause the most sickness and deaths; (2) To what extent those diseases prevail; (3) The methods of introduction and spread of those diseases; (4) The period of incubation of each of those diseases; (5) The average duration of each disease after contraction; (6) The season of the year at which each of such diseases is most prevalent and likely to be contracted; (7) The age at which persons are most likely to contract each disease; (8) The age at which there is greatest danger of persons dying from each disease; (9) The comparative susceptibility of the sexes to contraction of each disease; (10) The localities in the State where each disease is known to be usually most prevalent; (11) Whether or not each disease is more prevalent in large centers of population than in the more sparsely populated rural districts; (12) The comparative mortality from each disease; (13) The death-rate and the sickness-rate from each disease; (14) The best measures for the prevention and for the restriction of each disease; (15) Results of efforts made for the pre-

vention and restriction of each disease; (16) The usual vehicles of transmission in each disease; (17) The results of neglect of restrictive measures in outbreaks of each disease; and, (18) The efficacy of isolation and disinfection in each disease.

The increasingly large number of replies received in answer to communications relative to communicable diseases, the general desire manifested by health officers for documents on the restriction of those diseases, and the general care taken to send complete reports to this office, show an increasing interest among the people, and a commendable effort on the part of the local health authorities to have every means employed to prevent the spread of communicable diseases. The number of communications which annually pass to and from this office relative to dangerous communicable diseases, has increased greatly during the last few years.

Persistent efforts of this Board have been directed toward impressing the people of the State with the necessity of adopting restrictive measures,—isolation and disinfection, in outbreaks of communicable diseases.

As intimated above, these efforts have been productive, among the people and health officials of the State, of increased interest in sanitary progress; much, however, is still to be desired in that direction.

Definition of the Term "Outbreak," as Used in this Article.

For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area.

DIPHTHERIA IN MICHIGAN—YEAR ENDING DECEMBER 31, 1897.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE
BOARD OF HEALTH.

During the year ending December 31, 1897, there were reported to the Secretary of the State Board of Health 495 outbreaks of diphtheria in 396 localities in Michigan, which resulted in 4,132 cases and 756 deaths.

Beginning with September, 1897, returns of all deaths in Michigan have been made to the Secretary of State at the end of each month. These records have been used for reference in the compilation of this article whenever the number of deaths returned to the Secretary of State, from a given locality, exceeded the number reported from the same locality to this office. Where possible to do so, the names of decedents appearing on the death certificates and those appearing on the health officers' reports to this office were compared, and any that appeared on the death certificates that had been omitted in the health officers' reports were added to the list for this compilation. Although the reported number of cases of diphtheria for the year 1897 exceeded the number reported in 1896 by 119, it is gratifying to note that, even with this new means of making our death statistics more complete one less death from diphtheria was reported for 1897 than for the previous year.

DIPHTHERIA IN 1897, COMPARED WITH PREVIOUS YEARS.

According to Reports made to the Secretary of the State Board of Health.

From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by local health authorities throughout the State to furnish in their reports the information desired by the State Board. These facts, together with the constantly increasing population, make it difficult to determine the exact increase or decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom; and these facts should be borne in mind in referring to Table 1. While the above-mentioned facts might reasonably be expected to produce a constant increase in the reported prevalence of the disease, Table 1 shows that such increase has not occurred. In 1890 there was a marked increase in the prevalence of the disease as compared with the previous two years; but since then, notwithstanding the causes above mentioned, no considerable increase has occurred; and in 1894 there was shown a very decided decrease in both the prevalence of the disease and the fatality therefrom.

The year 1895 showed a still smaller reported number of outbreaks, cases, and deaths. In 1896 there was an increase in the reported cases and deaths as compared with the previous two years, but in 1896 the per cent of deaths to cases (fatality) was the lowest of any of the 15 years, 1882-96. In 1897 there was an increase in the reported numbers of outbreaks, localities, and cases, as compared with 1896, but there was one less death

reported than in the previous year. The average cases and deaths per outbreak, and the per cent of cases which proved fatal were all less in 1897 than in 1896. Some part of this may have been due to greater care on the part of health officers and others in enforcing restrictive measures; but this could not have had any influence toward lessening the per cent of cases which proved fatal, therefore this is probably to be credited to the use of antitoxin.

TABLE 1.—DIPHTHERIA IN MICHIGAN.—*Numbers of reported outbreaks, localities (in which they occurred), cases and deaths; average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, as reported for each of the sixteen years, 1882-97; also averages of the same for the thirteen years, 1884-96, and comparisons of the facts for 1897 with those for 1896 and with the averages for the thirteen years, 1884-96.*

Year.	Reported outbreaks.	Reported localities.	Reported cases.	Average cases per outbreak.	Reported deaths.	Average deaths per outbreak.	Deaths per 100 cases.
1882-----		163	2,046		495		24.
1883*-----		125	2,246		543		24.
1884†-----	362	302	3,915	10.8	905	2.5	23.
1885-----	467	396	4,018	8.6	964	2.0	24.
1886-----	550	422	4,244	7.7	982	1.8	23.
1887-----	466	371	3,382	7.3	825	1.8	24.4
1888-----	337	283	2,228	6.6	532	1.6	23.9
1889-----	398	329	3,157	7.9	683	1.7	21.6
1890-----	442	365	4,206	9.5	1,050	2.4	25.
1891-----	535	461	4,355	8.2	1,002	1.9	22.8
1892-----	527	463	4,818	9.1	1,099	2.1	22.8
1893-----	546	460	4,736	8.7	1,092	2.0	23.1
1894†-----	435	367	3,852	8.9	744	1.7	19.3
1895-----	401	347	3,433	8.6	708	1.8	20.6
1896-----	423	331	4,013	9.5	757	1.8	18.9
1897-----	495	396	4,132	8.3	756	1.5	18.3
Average for thirteen years, 1884-1896.....	453	377	3,876	8.6	873	1.9	22.5
Variations in 1897 from 1896.....	+72	+65	+119	-1.2	-1	-.3	-.6
Variations in 1897 from the average for 13 years, 1884-96..	+42	+19	+256	-.3	-117	-.4	-4.2

* The use of the blank form "M" for weekly reports was begun in May, 1883.

† In compiling diphtheria the use of the annual reports of health officers was begun in 1884.

‡ The use of antitoxin for diphtheria was commenced about this time.

In previously published Annual Reports of this Board have appeared tables and diagrams showing death-rates in Michigan from diphtheria per 100,000 of population, for a long series of years (samples of which are printed on page 181 of the Report for 1895). Said tables and diagrams are based on reports made to the office of the Secretary of State. Data for 1897 have not yet been compiled in that office, therefore that table cannot include 1897, and is omitted from this report.

Distribution of Diphtheria by Divisions and Counties During 1897.

Table 2 exhibits the distribution of diphtheria in 1897, by divisions of the State; Table 3 and the accompanying map exhibit in slightly different ways, the reported diphtheria, by counties, during the year 1897. The tables exhibit the sickness-rates and death-rates as well as the reported numbers of cases of sickness and of deaths. The map for 1897 exhibits, by counties, the number of localities infected, the number of outbreaks which occurred, and the number of cases and deaths per 10,000 of population.

TABLE 2.—*Exhibiting the Population of Michigan for the year 1897, by tiers of counties (Upper Peninsula as one tier); also the number of cases of and deaths from Diphtheria REPORTED from each of the divisions for 1897, and the numbers of cases and deaths per 10,000 population of each division.*

Counties in Groups, most Northern ones First.			Estimated Population. 1897.*	Reported Cases of Diphtheria, 1897.	Reported Cases per 10,000 of Population.	Reported Deaths from Diphtheria, 1897.	Reported Deaths per 10,000 of Population.
State.....			2,352,455	4,132	17.56	756	3.21
Upper Penin- sula.....	Alger. Delta. Schoolcraft. Luce. Houghton. Ontonagon. Gogebic. Baraga.	Mackinac. Chippewa. Keweenaw. Marquette. Iron. Menominee. Dickinson.	226,143	716	31.66	89	3.94
Eleventh tier of counties....	Emmet. Charlevoix. Leelanau.	Cheboygan. Presque Isle.	46,408	70	15.08	7	1.51
Tenth tier of counties.....	Antrim. Otsego.	Alpena.	52,218	203	38.88	30	5.75
Ninth tier of counties.....	Montmorency. Benzie. G'd Traverse.	Crawford. Oscoda. Alcona.	46,497	34	7.31	13	2.80
Eighth tier of counties.....	Manistee. Wexford. Missaukee. Roscommon.	Ogemaw. Iosco.	69,267	34	4.91	8	1.15
Seventh tier of counties....	Mason. Lake. Osceola. Clare.	Gladwin. Bay. Huron. Arenac.	164,859	315	19.11	52	3.15
Sixth tier of counties.....	Oceana. Newaygo. Mecosta. Isabella.	Midland.	95,459	108	11.31	17	1.78
Fifth tier of counties.....	Muskegon. Montcalm. Gratiot. Saginaw.	Tuscola. Sanilac.	251,793	497	19.74	78	3.10
Fourth tier of counties.....	Ottawa. Kent. Ionia. Clinton.	Shiawassee. Genesee. Lapeer. St. Clair.	395,525	370	9.35	66	1.67
Third tier of counties.....	Allegan. Barry. Eaton. Ingham.	Livingston. Oakland. Macomb.	233,901	232	9.92	47	2.01
Second tier of counties....	Van Buren. Kalamazoo. Calhoun. Jackson.	Washtenaw. Wayne.	537,157	1,344	25.02	299	5.57
First tier of counties.....	Berrien. Cass. St. Joseph. Branch.	Hillsdale. Lenawee. Monroe.	233,301	209	8.96	50	2.14

* Population estimated by average annual increase, arithmetical method, based on U. S. Census of 1890 and the State Census of 1894, computed in the Office of the State Board of Health.

TABLE 3.—*Numbers of Cases and Deaths reported from Diphtheria per 10,000 persons living in each county in Michigan during the year 1897. (Compiled from reports of health officers, clerks, etc.)*

Counties.	*Estimated Population for 1897.	Number of reported		Number per 10,000 population of		Counties.	*Estimated Population for 1897.	Number of reported		Number per 10,000 population of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,352,455	4,132	756	17.56	3.21	Keweenaw ..	2,873	14	2	48.73	6.96
						Lake	5,441	1	0	1.84	0
Alcona	5,425	2	1	3.69	1.84	Lapeer	28,628	11	2	3.84	.70
Alger	1,495	1	1	6.69	6.69	Leelanau	10,624	32	7	30.12	6.59
Allegan	39,360	14	2	3.56	.51	Lenawee	48,611	17	6	3.50	1.23
Alpena	19,319	152	17	78.68	8.80	Livingston	20,121	11	1	5.47	.50
Antrim	13,938	5	2	3.59	1.43	Luce	2,268	0	0	0	0
Arenac	7,888	1	0	1.27	0	Mackinac	6,792	0	0	0	0
Baraga	5,129	0	0	0	0	Macomb	32,818	102	24	31.08	7.31
Barry	23,636	15	2	6.35	.85	Manistee	27,527	23	5	8.36	1.82
Bay	64,973	203	29	31.24	4.46	Marquette	39,454	130	25	32.95	6.34
Benzie	10,183	1	1	.98	0	Mason	19,950	4	1	2.01	.50
Berrien	48,898	114	22	23.31	4.50	Mecosta	21,503	21	3	9.77	1.40
Branch	25,769	11	3	4.27	1.16	Menominee	24,646	65	11	26.37	4.46
Calhoun	50,450	19	3	3.77	.59	Midland	15,139	10	2	6.61	1.32
Cass	21,343	17	7	7.97	3.28	Missaukee	8,385	0	0	0	0
Charlevoix	12,012	4	1	3.33	.83	Monroe	33,814	24	7	7.10	2.07
Cheboygan	15,336	45	1	29.34	.65	Montcalm	35,299	42	5	11.90	1.42
Chippewa	17,799	0	0	0	0	Montmor'ncy	3,151	9	1	28.56	3.17
Clare	8,290	2	0	2.41	0	Muskegon	35,307	155	18	43.90	5.10
Clinton	26,077	17	6	6.52	2.30	Newaygo	18,112	1	0	.55	0
Crawford	2,521	0	0	0	0	Oakland	43,749	39	8	8.91	1.83
Delta	22,211	10	4	4.50	1.80	Oceana	17,275	64	9	37.05	5.21
Dickinson	15,261	40	1	26.21	.66	Ogemaw	5,679	0	0	0	0
Eaton	33,011	25	6	7.57	1.82	Ontonagon	9,211	4	0	4.34	0
Emmet	12,231	1	0	.82	0	Osceola	17,859	11	5	6.16	2.80
Genesee	41,395	26	3	6.28	.72	Oscoda	1,733	0	0	0	0
Gladwin	5,419	0	0	0	0	Otsego	5,186	5	3	9.64	5.78
Gogebic	14,771	161	19	109.00	12.86	Ottawa	41,877	23	4	5.49	.96
Gr'd Traverse	20,635	24	10	11.63	4.85	Presque Isle	6,829	20	5	29.29	7.32
Gratiot	28,857	46	8	15.94	2.78	Roscommon	1,375	0	0	0	0
Hillsdale	29,981	0	0	0	0	Saginaw	81,528	118	18	14.47	2.21
Houghton	50,680	290	26	57.28	5.14	Sanilac	34,962	127	25	36.33	7.15
Huron	35,039	93	17	26.54	4.85	Schoolcraft	8,109	1	0	1.23	0
Ingham	41,206	26	4	6.31	.97	Shiawassee	34,281	147	16	42.88	4.67
Ionia	36,334	3	1	.83	.28	St. Clair	55,983	69	17	12.33	3.04
Iosco	10,177	10	3	9.83	2.95	St. Joseph	24,885	26	5	10.45	2.01
Iron	5,494	0	0	0	0	Tuscola	35,840	9	4	2.51	1.12
Isabella	23,430	12	3	5.12	1.28	Van Buren	31,447	10	2	3.18	.64
Jackson	47,663	37	8	7.76	1.68	Washtenaw	44,483	18	1	4.05	.23
Kalamazoo	44,143	53	8	12.01	1.81	Wayne	318,971	1,207	277	37.84	8.68
Kalkaska	6,000	7	1	11.67	1.67	Wexford	16,124	1	0	.62	0
Kent	130,950	74	17	5.65	1.30						

* Population estimated by average annual increase, arithmetical method, based on U. S. Census of 1890 and the State Census of 1894; computed in the office of the State Board of Health.



The sickness-rates and death-rates shown on the above map do not exactly agree in some instances with those in the table (3), as but one decimal place could be used on the map, while in the table the rates are carried out to the second decimal place.

Table 2 exhibits the latitudinal distribution of diphtheria throughout the State, by tiers of counties. All the counties of the Upper Peninsula are considered as one tier.

rate (7.31 per 10,000 population) was in the ninth tier of counties; that the highest sickness-rate (38.88 per 10,000 population) was in the tenth tier of counties; and that the next highest sickness-rate (31.66 per 10,000 population) was in the Upper Peninsula.

In the second tier of counties, the city of Detroit had a sickness-rate of 37.67 per 10,000 population, and the tier, excluding the city of Detroit, had a sickness-rate of 11.75 per 10,000 population. In the fourth tier of counties, the city of Grand Rapids had a sickness-rate of 8 per 10,000 population, and the tier, exclusive of Grand Rapids, had a sickness-rate of 9.75 per 10,000 population.*

Table 3 shows that the sickness-rate for the whole State during the year was 17.56 per 10,000 inhabitants. It also shows that the highest sickness-rate was in Gogebic county, 109 cases per 10,000 population. Other counties where the sickness-rates were greatly in excess of the sickness-rate for the State are: Alpena, 78.68; Houghton, 57.28; Keweenaw, 48.73; Muskegon, 43.90, and Shiawassee, 42.88. The lowest sickness-rate, as shown in Table 3, was in Newaygo county, .55 of one case per 10,000 population. Other counties where the sickness-rates were much below the sickness-rate for the State are: Wexford, .62; Emmet, .82; Ionia, .83, and Benzie, .98.

Death-rates from Diphtheria Reported as having Occurred in 1897.

The last columns of Tables 2 and 3 supply data showing the death-rates from diphtheria by divisions, and for each county in the State. By these tables it may be seen that the death-rate for the whole State per 10,000 inhabitants was 3.21.

Table 2 shows the greatest death-rates to have been in the tenth and second tiers of counties.

Table 3 shows that the greatest death-rate from this disease during the year (12.86 deaths per 10,000 of population) was in Gogebic county. Other counties where the death-rates were much above the average death-rate for the State were: Alpena, 8.80; Wayne, 8.68; Presque Isle, 7.32; Macomb, 7.31; Sanilac, 7.15; Keweenaw, 6.96; Alger, 6.69; Leelanau, 6.59, and Marquette, 6.34. The lowest death-rate in a county where death occurred was in Washtenaw county, .23 of one death per 10,000 population. Other counties where the death-rates were far below the average death-rate for the State were: Ionia, .28; Livingston and Mason, each .50, and Allegan .51, of one death per 10,000 population.

From the following named twelve counties, with an aggregate population of 92,575, no diphtheria was reported during the year: Baraga, Chippewa, Crawford, Gladwin, Hillsdale, Iron, Luce, Mackinac, Missaukee, Ogemaw, Oscoda, and Roscommon. From the eight counties mentioned below, there was an aggregate of 12 cases of diphtheria reported with no deaths: Arenac, Clare, Emmet, Lake, Newaygo, Ontonagon, Schoolcraft, and Wexford.

The Proportionate Fatality or "Case Mortality"

The proportionate fatality or "case mortality" from diphtheria in 1897, i. e., the proportion of reported cases which proved fatal, was, for the whole State, 18.3 per cent or one death to 5.47 cases.

* The reports of the city Boards of Health of Detroit and Grand Rapids state the population of these cities for the year 1897, 275,000 and 90,000 respectively, and the cases of sickness from diphtheria reported to this office from those cities were 1,036 and 72 respectively.

TABLE 4.—DIPHTHERIA IN CITIES, VILLAGES AND TOWNSHIPS IN MICHIGAN.—
Numbers of outbreaks, cases, and deaths which occurred in 1897, and the comparative numbers of outbreaks, cases, deaths, and the fatality from this disease in cities, villages, and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)

Classes of Political Divisions.	Popula- tion.*	Health jurisdictions.	Outbreaks in :			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 10,000 Population.				
			Localities.		No. of.				Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Cases.	Deaths.
			No. of.	Per cent of all local- ities.									
State (83 counties)-----	2,352,455	1,581	396	25	495	4,132	756	18	17.56	3.21			
Cities-----	908,111	76	54	71	82	2,193	418	19	24.15	4.60			
Villages-----	249,987	296	71	24	86	285	58	20	11.40	2.32			
Townships -----	1,194,357	1,009	271	22	327	1,654	280	17	13.85	2.35			

* Estimated by arithmetical method in the office of the State Board of Health.

From the data in the above table (which agree substantially with the data in a similar table for the previous year, 1896) it may be observed that 71 per cent of the cities, 24 per cent of the villages, and 22 per cent of the townships were infected with diphtheria. But the average population of the cities is nearly fourteen times the average population of the villages. The lowest case-rate (11.40) and death-rate (2.32) occurred in the villages; the highest case-rate (24.15) and death-rate (4.60) occurred in the cities, being about twice as great as in the villages. The lowest fatality (17 per cent) occurred in the townships, and the highest (20 per cent) occurred in the villages.

Diphtheria in Each Month of the Year 1897.

TABLE 5.—*Exhibiting the reported number of outbreaks of Diphtheria which Began, the number which Ended, and the number which were Present, in each Month of the Year 1897, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Outbreaks began ..	79	30	23	25	30	42	19	20	34	41	45	48	436
Outbreaks ended ..	30	49	32	19	22	27	31	21	23	27	34	74	389
Outbreaks present.	97	90	69	59	72	86	76	65	79	93	110	129	.....

The last line of figures in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. There may be a time during the outbreak when no cases are present, but if the subsequent cases can be attributed to infection from the preceding ones, it is called one outbreak. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak

ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 47 more beginnings than endings of outbreaks reported during the year 1897.

TABLE 6.—*Exhibiting the Number and Per Cent of Localities from which the presence of Diphtheria was reported, the Number and Per Cent of Cases of Diphtheria Present in Michigan in each Month, and the Number and Per Cent of Cases of Diphtheria Taken Sick in each Month, during the Year 1897. (Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Localities, number	96	89	68	58	71	84	74	64	76	93	110	126
Per cent	24.2	25.0	17.2	14.7	17.9	21.2	18.7	16.2	19.2	23.5	27.8	31.8
Cases present, number....	558	462	398	275	259	322	309	228	382	640	642	529
Per cent	13.5	11.2	9.6	6.7	6.3	7.8	7.5	5.5	9.2	15.5	15.5	12.8
Cases taken sick, number..	484	299	299	185	205	250	212	165	322	499	469	361
Per cent	11.7	7.2	7.2	4.5	5.0	6.1	5.1	4.0	7.8	12.1	11.4	8.7

Source of Contagium of Diphtheria, and How the Disease is Spread.

Of the 4,132 cases of diphtheria reported, during the year 1897, as exhibited in the following table, the local health officers reported the source of contagium as follows:—Traced to a former case, 906; traced to cases of "sore throat," etc., 6; due to infection from "clothing," etc., 5; attributed to unsanitary conditions, 11; from outside jurisdiction, 71; probably from outside jurisdiction, 16; unknown, 1,598; not reported or indefinitely reported, 1,519; total, 4,132.

TABLE 7.—*Reported source of contagium of cases of Diphtheria, in 1897.*

Traced to a former case.....	906
Traced to cases of "sore throat," "tonsillitis," and "membranous croup".....	6
Due to infection from "clothing," "old rags," etc.....	5
Alleged unsanitary conditions.....	11
Contagium reported as from outside jurisdiction.....	71
Contagium reported as probably from outside jurisdiction.....	16
Unknown or reports not definite (includes those reported "Contagium," "Sporadic," "Spontaneous," "De Novo," etc.).....	1,598
Not reported.....	1,519
All cases.....	4,132

Cases Traced to a Preceding Case.

Table 7, shows that of the 4,132 reported cases of diphtheria, in the State in 1897, 906 were reported as traced to preceding cases of the disease.

In Table 7 are shown the sources of contagium as stated in the reports of health officials and others who make returns to this office. Such origin as from a "sore throat" or from "tonsillitis" indicates a mistake in diagnosis of the first cases through failure to recognize their diphtheritic nature. "Membranous croup" is diphtheria of the larynx, and is a term which should be so changed, as it misleads the common people into the belief that the disease is not diphtheria but something of a less serious nature.

"Unsanitary conditions" may favor the spread of diphtheria, and may cause the disease to assume a more malignant form; probably this is true of overcrowded and poorly-ventilated houses; but the disease does not originate from such unsanitary conditions; neither is its origin "spontaneous" or "de novo." The use of these terms as reported sources of diphtheria shows ignorance of the nature of the now well-known contagium of diphtheria.

Each year there is an increased number of cases of diphtheria reported as traced to former cases of the disease; this shows increased vigilance on the part of attending physicians and health officers, and a better knowledge of the true nature of the contagium. This is very encouraging, for, to successfully cope with a communicable disease we must understand the manner in which it spreads from person to person. The spread of this disease is by means of the specific contagium, and it can be prevented by isolating persons sick and those infected, until they are free from the disease, and then thoroughly disinfecting all articles and premises which have been infected.

TABLE 8.—*First, second and third localities, where the second locality was infected with Diphtheria from the first, and the third was infected from the second; and the number of cases and deaths from Diphtheria in the first, second and third localities with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Allegan county: Allegan village.....	*	---	Allegan county: Cassio township..... (Apr. 13-May 5.)	2	0			
Barry county: Middleville village.....	*	---	Barry county: Hastings city..... (Feb. 7-Feb. 14.)	1	0			
Berrien county: Benton Harbor city.... (June-Feb., 1898.)	12	3	Berrien county: Bainbridge township.. (Aug. 26-Aug. 30.)	1	1			
Berrien county: Niles city..... (1896-July 26.)	2	1	Berrien county: St. Joseph township... (May 9-May 15.)	4	2			
Branch county: Coldwater city..... (June 7-July 7.)	4	2	Branch county: Coldwater township... (June 16-July 10.)	1	0			
Calhoun county: Convis township.....	*	---	Calhoun county: Marshall township..... (July 8-Aug.)	3	1			
Clinton county: Elsie village..... (Nov. 15-Nov. 29.)	1	1	Shiawassee county: Fairfield township..... (Dec. 15-Dec. 23.)	1	0			
Clinton county: St. Johns village..... (Sept. —.)	1	0	Montcalm county: Richland township..... (Nov. 10-Dec. 1.)	1	0			
Gogebic county: Bessemer city..... (May 22-April 1898.)	128	10	Gogebic county: Bessemer township.... (May 29-Oct. 22.)	14	2			
Grand Traverse county: Garfield township..... (June 2-June 8.)	1	1	Grand Traverse county: Traverse City..... (Sept. 10 Sept. 28.)	1	0			
Gratiot county: Fulton township.....	10	1	Gratiot county: Newark township.....	6	2			
Gratiot county: Ithaca village.....	*	---	Montcalm county: Richland township..... (Dec. 5-Dec. 24.)	4	0			
Houghton county: Calumet township..... (Jan. 2-Jan., 1898.)	155	10	{ Houghton county: Lake Linden village.. (Sept. 2-Sept. 9.)	1	0			
			{ Torch Lake township.. (Jan. 6-Jan. 29.)	1	0			
			{ Keweenaw county: Allouez township..... (Jan. 11-Jan. 14.)	1	1			
Huron county: Bad Axe village..... (1896 Mar. 4.)	3	0	Huron county: Sebewaing village..... (Jan. 3.-Feb. 28.)	4	0			
Huron county: Chandler township.....	*	---	Huron county: Lake township..... (March 7 —.)	5	0			

* Diphtheria was not reported to this Office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 8.—CONTINUED.—*Movement of Infection of Diphtheria.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Huron county: Oliver township..... (Mar. 13 —.)	14	1	Huron county: Brookfield township.. (June 20-July 5.) Lake township..... (Apr. 23-May 6.) Tuscola county: Caro village..... (June 7-June 21.)	6 6 1	1 1 1			
Iosco county: Oscoda village.....	*	—	Sanilac county: Lexington village..... (May 26-June 2.)	1	1			
Jackson county: Jackson city..... (Jan. 4-Dec. 12.)	29	5	Jackson county: Spring Arbor Tp..... (June 14-Sept. 8.)	4	1			
Kalamazoo county: Kalamazoo city..... (Jan. 2 —.)	41	6	Kalamazoo county: Comstock township... (May 5-June 7.)	1	0			
Kent county: Grand Rapids city..... (Jan. — Dec. 31.)	72	16	Barry county: Thornapple township (Jan.-Jan. 22.) Ottawa county: Wright township (Jan.-Jan. 15.)	1 1	0 0			
Leelanau county: Centerville township... (1896-Sept. 29.)	17	2	Leelanau county: Leelanau township... (Jan. 2-Jan. 25.)	3	1			
Macomb county: Warren township..... (1896-Jan. 7, 1898.)	6	2	Macomb county: Erin township..... (June 4-Nov. 25.)	9	2			
Macomb county: Washington township.. (Sept. 22-Oct. 24.)	2	1	Macomb county: Lenox township..... (Nov. 20-Dec. 24.)	1	0			
Manistee county: Brown township.....	*	—	Manistee county: Morilla township..... (May 25-May 25.)	1	1			
Marquette county: Ispheming city..... (Jan.-Dec.)	85	11	Benzie county: Homestead township.. (Aug. 17-Aug. 20.)	1	1			
Mecosta county: Aina township..... (Nov.-1898.)	7	3	Mecosta county: Deerfield township... (Nov.-Jan. 30, 1898.)	8	1			
Menominee county: Spalding township..... (June 13-Nov. 11.)	21	5	Menominee county: Nadeau township..... (Aug. 28-Nov. 15.)	5	0			
Midland county: Midland city.....	*	—	Midland county: Ingersoll township... (Dec. 1-Dec. 12.)	1	0			
Montcalm county: Carson City village....	*	—	Gratiot county: Sumner township (Jan. 11-Mar. 3.)	4	1			
Montcalm county: Ferris township..... (Jan.-Mar.)	4	1	Shiawassee county: Sciota township..... (Jan. 4 —.)	2	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 8.—CONTINUED.—*Movement of Infection of Diphtheria.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Muskegon county: Muskegon city..... (Jan. 1-Jan. 30, 1898.)	142	16	Muskegon county: Moorland township... (June 18-July 2.)	1	0	Oceana county: Grant township..... (Apr. 5-Apr. 17.)	3	0
Muskegon county: Whitehall village.....	*	----	Muskegon county: White River township (Jan. 6-Jan. 30.)	5	1			
Osceola county: Hersey village.....	*	----	Osceola county: Reed City village..... (June 15-Aug. 3.)	3	2			
Ottawa county: Grand Haven township.	*	----	Ottawa county: Grand Haven city..... (Dec. 15-Dec. 30.)	2	0			
Saginaw county: Saginaw city..... (Jan.-Mar., 1898.)	80	8	Ingham county: Mason city..... (Jan. 6 —.)	1	0			
			Saginaw county: Carrollton township.. (Nov. 13-Feb. 11, '98.)	11	3			
			St. Clair county: Kenockee township.. (Oct. 25-Nov. 18.)	2	1			
Sanilac county: Evergreen township.... (June-July 7.)	4	0	Sanilac county: Argyle township..... (June 19-July 3.)	4	1			
Sanilac county: Evergreen township.... (Dec. 1-Dec. 12.)	2	1	Sanilac county: Argyle township..... (Dec. 25-Jan. 31, 1898.)	4	0			
Sanilac county: Elk township..... (Sept. 1-Feb. 21, 1898.)	43	7	St. Clair county: Yale village..... (Sept. 24-Oct. 8.)	1	0			
Sanilac county: Minden township..... (Dec. 1-Dec. 5.)	1	1	Sanilac county: Minden City village... (Dec. 7-Dec. 20.)	1	0			
Sanilac county: Sanilac township.....	*	----	Sanilac county: Lexington village..... (Jan. 16-Feb. 15.)	1	0			
Sanilac county: Wheatland township...	3	0	Sanilac county: Argyle township..... (Sept. 24-Oct. 15.)	6	0			
Shiawassee county: Owosso city..... (Jan.-Apr., 1898.)	100	11	Shiawassee county: Laingsburg village.... (Oct.-Nov.)	1	0			
Shiawassee county: Vernon village.....	*	----	Shiawassee county: Byron village..... (Jan. 26-Mar. 7.)	5	1			
St. Clair county: Casco township..... (Jan. 24-Feb. 26.)	14	2	St. Clair county: Cottrellville township (Feb. 11-Feb. 26.)	1	1			
St. Joseph county: Sturgis city..... (July 10-Sept. 21.)	4	1	St. Joseph county: Burr Oak village..... (Oct. 11-Oct. 30.)	4	0			
St. Joseph county.....	----	----	Cass county: Porter township..... (Aug. 8-Oct. 25.)	7	3			

* This foot-note is on the bottom of the first page of this table.

TABLE 8.—CONTINUED.—*Movement of Infection of Diphtheria.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Tuscola county: Reese village.....	2	2	Bay county: Merritt township.....	1	0			
Van Buren county: Bloomingdale village.... (June 3-Jan., 1898.)	5	1	Allegan county: Monterey township.... (Oct. 19-Nov. 3.)	1	0			
			Lapeer county: Hadley township..... (Apr. 26-May 1.)	1	1			
			Monroe county: Exeter township..... (Apr. 4-May 5.)	3	0			
Wayne county: Detroit city..... (Jan. 1-Jan. 28, 1898.)	1,036	240	Oakland county: Novi township..... (June 14-June 30)	1	0			
			Wayne county: Ecorse township..... (Nov. 29-Dec. 3.)	1	1			
			Greenfield township.. (Apr. 26-June 1.)	3	0			
			Livonia township..... (Dec. 10-Dec. 23.)	1	0			
Wayne county: Ecorse township..... (Jan.-Feb. 12.)	33	4	Wayne county: Hu on township..... (Jan. —.)	4	1			
Grosse Point township.. (Dec., 1896-Jan., 1897.)	7	1	Grosse Point village.. (Jan. 20-Feb.)	4	1			
Nankin township..... (— Nov. 21.)	1	1	Taylor township..... (Nov. 17-Dec. 6.)	4	1			
Nankin township..... (Jan. Feb.)	1	1	Rollins township..... (Jan. 26-Jan. 29.)	1	1			
Springwells township.. (1896-Feb. 28, 1898.)	197	51	Greenfield township (Oct. 16-Nov. 17.)	8	0			
Wyandotte city.....	8	2	Monguagon township.. (Dec. 14-Feb. 28, 1898.)	12	1	Wayne county: Brownstown township (Dec.-Jan. 20, 1898.)	2	1
Northern Michigan.....			Van Buren county: Bloomingdale village.. (June 3-June 14.)	4	1			

Movement of Infection of Diphtheria into Michigan from outside the State.

Boston.....			Houghton county: Franklin township.... (Dec. 28-Jan. 18, 1898.)	1	0			
Canada.....			Isabella county: Mt. Pleasant city.... (Feb. 9-Feb. 13.)	1	1			
			Lapeer county: Hadley village..... (Jan. 10-Feb. 15.)	3	0			
Chicago.....			Marquette county: Marquette city..... (Sept.)	1	0			
			Van Buren county: South Haven Tp..... (Sept. 29-Oct. 9.)	2	0			

TABLE 8.—CONTINUED.—*Movement of Infection of Diphtheria into Michigan from Outside the State.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Indiana: New Carlisle.....			Berrien county: Gallen village..... (Mar. 4—.)	31	4	Berrien county: Buchanan village..... (Sept. 1-Sept. 18.) Weesaw township..... (Aug. 20-Sept. 16.) Weesaw township..... (Dec. 26-1898.)	2 1 7 11	0 0 1 3
Indiana: South Bend.....			Berrien county: Gallen township..... (June 5,—.)	22	6	Berrien county: Lincoln township..... (Oct. 1-Oct. 12.)	2	0
Indiana.....			Cass county: Vandalla village..... (Feb. 2-Feb. 16.)	1	0			
			Cass county: Mason township..... (Dec. 1-Dec. 11.)	5	1			
New York City.....			Alpena county: Alpena city..... (July 22—.)	143	17	Alpena county: Alpena township..... Ioseo county: Baldwin township..... (Oct. 13-Nov. 9) Wulber township..... (Oct. 7-Nov. 3.) Presque Isle county: Belknap township..... (Nov. 19-Dec.) Posen township..... (Nov. 16-Dec. 5.)	2 4 4 12 4	0 2 1 2 2
Wisconsin: Milwaukee.....			Dickinson county: Iron Mountain city..... (Aug. 20-May, 1898.)	42	1	Dickinson county: Norway city..... (Sept. 27-Oct. 12.)	1	0
			Ottawa county: Grand Haven city..... (Nov. 27-Dec. 27.)	1	0			
			Presque Isle county: Rogers township..... (June 25-July 24.)	4	1			
Probable Movement of Infection of Diphtheria.								
Berrien county: Benton Harbor city.... (June-Feb., 1898.)	12	3	Ottawa county: Spring Lake village.. (Sept. 7-Nov.)	4	0			
Berrien county: Gallen village..... (Mar. 4—.)	31	4	Berrien county: Bertrand township.... (June 1-June 22.) Bertrand township.... (Nov. 13-Nov. 28.)	4 1	0 0			
Branch county: Gilead township.....	*		Branch county: Coldwater city..... (May 22-Apr., 1898.)	2	1			
Branch county: Coldwater township....	1	0	Genesee county: Flint township..... (Jan. 3-Feb. 12.)	3	0			
Eaton county: Eaton Rapids township. (Oct. 8-Dec. 16.)	8	0	Eaton county: Windsor township..... (Dec. 16-Dec. 20.)	1	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 8.—CONTINUED.—*Probable Movement of Infection of Diphtheria.*

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Gogebic county: Bessemer city..... (May 22-Apr., 1898.)	128	10	Gogebic county: Ironwood city..... (Oct. 1-May, 1898.)	31	8			
Grand Traverse county: Mayfield township.....	4	1	Grand Traverse county: Blair township.....	4	1			
Huron county: Oliver township..... (Mar. 13 —.)	14	1	Huron county: Winsor township.... (July 7-July 19.)	4	2			
Ingham county: Lansing city..... (Jan. 12-Nov. 20.)	16	1	Ingham county: Mason city..... (Jan. 2 —.)	1	0			
Jackson county: Jackson city..... (Jan. 4-Dec. 12.)	29	5	Ingham county: Leslie village..... (Nov.-Dec. 10.)	2	0			
Macomb county: New Baltimore village. (1896-Jan. 30, 1897.)	3	2	Macomb county: Chesterfield township (Jan. 17-Dec. 27.)	25	5			
			Lenox township..... (Jan. 10-Feb. 13.)	3	1			
Montcalm county: Richland township..... (Mar. 30-Oct. 2.)	10	1	St. Clair county: Casco township..... (Jan. 24-Feb. 26.)	14	2			
Osceola county: Hersey township.....	4	1	Montcalm county: Home township..... (July 31-Aug. 6.)	1	1			
Shiawassee county: Owosso city..... (Jan.-Apr. 1898.)	100	11	Osceola county: Reed City village..... (Jan. 8-Jan. 22.)	1	0			
St. Joseph county: Sturgis city..... (July 10-Sept. 21.)	4	1	Shiawassee county: Corunna city..... (Oct. 18 —.)	5	0			
Park township..... (Dec. 7-Dec. 10.)	1	1	Rush township..... (Nov. 5-Jan. 6, 1898.)	13	1			
Wayne county: Detroit city..... (Jan. 1-Jan. 28, 1898.)	1,036	240	St. Joseph county: Sturgis township..... (Oct. 2-Nov. 21.)	5	1			
			Three Rivers city..... (Dec. 27-Jan. 8.)	1	0			
			Wayne county: Dearborn township... (Dec. 19-Dec. 26.)	1	1			
			Romulus township..... (Apr. 26-July.)	3	1			
			Wayne village..... (Nov. 9-Dec. 11.)	5	4			

TABLE 8.—CONCLUDED.—**Probable Movement of Infection of Diphtheria into Michigan from Outside the State.**

First Localities from which Diphtheria was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Canada			Sanilac county: Elk township..... (Sept. 1-Feb. 21, 1898.)	43	7	{ Sanilac county: Brown City village.. (Oct. 16-Jan. 8, 1898.) Speaker township... (Oct. 5-Dec. 30.)	5 12	2 3
Chicago			{ Oceana county: Pentwater village.... (Sept. 2 —.)	52	8			
			{ Oceana county: Pentwater township.. (Oct. 21-Nov. 14.)	7	0			
Indiana: Elkhart			Cass county: Jefferson township... (Mar. 5-Mar. 11.)	3	3			
Oregon			Grand Traverse county: Traverse city	1	1			
			(Sept. 10-Sept. 28.)					

MOVEMENTS OF CONTAGIUM OF DIPHTHERIA IN 1897.



THIS MAP ILLUSTRATES TABLE 9. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS. ——— DEFINITELY TRACED. - - - - - PROBABLY TRACED.

[PLATE 990.]

On the accompanying map, the spread of diphtheria in Michigan, in the year 1897, as reported to this office, is shown by black lines which connect the localities; the arrow-heads indicate in each instance the direction of the movement.

Diphtheria Alleged to have been Contracted from a Cat.

C. Bruce Fuqua, health officer of Green township, Mecosta county, in reporting relative to the source of contagium in an outbreak of diphtheria in his jurisdiction, stated as follows:

"On about the fifth of January, William Hall, living eight miles northeast of this place and in this (Green) township, was taken ill with what was diagnosed as malignant sore throat by his physician; in ten days he was dead, and on that day it was made known that he had diphtheria. He was 25 years old, and was one of five children; a few days

later two others came down with the same disease. In a short time six of them had it, including a young lady who was there helping to care for the sick. The last one taken was Mr. Hall senior; he came down about ten days since and had a very mild case.

"Since the first death the place has been placarded and quarantined, and all possible sanitary measures taken, which however could not be satisfactorily done, as the family are in most deplorable circumstances—the house old and very small.

"The disease has about spent itself. Each member of the family having had it. The nurse, a man, is a strong, healthy fellow and seems to have no fear of the contagium.

"At the time William Hall was taken he was working at Bennett's or Stearn's siding, in the lumber woods. He sat around the house several days before having to take his bed. His father claims he contracted the disease from a cat that died with some throat trouble a couple of days previous to his death; the cat was a special pet of the young man."

The man first taken sick had been working at a lumber camp and may have contracted the disease there. It is quite possible that the cat contracted the disease from the young man. But as cats and other animals are susceptible to diphtheria, and may also carry the contagium on their hair, as well as in their throats, they should not be allowed in the house where there is a case of diphtheria.

Diphtheria Contagium Probably Traced to a Diseased Dog

R. J. Maas, M. D., health officer of Franklin township, Houghton county, in reporting relative to an outbreak of diphtheria in his jurisdiction, in which there occurred 13 cases with one death, gave the source of contagium as probably from a diseased dog in the first case; all the other cases could be traced to the first case. The dog had enlarged and suppurating glands in the neck, and a diseased ear. The dog was shot and buried.

Animals and fowls having disease of the throat or the glands of the neck should be isolated or destroyed at once, as there is probability of the disease being diphtheria, and great danger of its being communicated to persons.

Diphtheria Contagium Carried by a Nurse.

Robert Dool, health officer of Jefferson township, Cass county, in reporting relative to an outbreak of diphtheria in his jurisdiction, stated substantially as follows: A nurse came from Elkhart, Indiana, into Jefferson township, where she exposed a woman 23 years old, and her twin babies aged about 3 weeks, to the infection of diphtheria, from which disease all three patients died. This spread of infection must have resulted from inexcusable carelessness on the part of the health authorities or of those who failed to report to those officials in Elkhart, and to carelessness or ignorance on the part of the nurse. These three deaths could have been prevented by isolation of the nurse until the expiration of the period of incubation, and then thorough disinfection of her person and clothing before she was allowed to visit persons susceptible to the disease.

Diphtheria Probably Contracted while Traveling.

Dr. W. W. Root, of Mason, wrote the Secretary of this Board, January 8, 1897, relative to the source of infection of an outbreak of diphtheria in that city as follows:

"We have a case of diphtheria here in the person of a young lady from Mt. Morris. *
* * She was taken sick last Saturday night; she was on her way to school at Hillsdale, and stopped to visit a school friend here. She is not aware that she has been exposed to diphtheria, but she stopped at a hotel in Lansing for dinner, on the Wednesday before; in the same room there was a sick teacher who had a high fever and a sore throat. Is it

possible that this lady had the disease and that my patient contracted the disease from her in so short a time? She is doing well, treatment * * * *. We have quarantined her, and are using every precaution to prevent the disease from spreading. Her mother is with her and is a lady of good sense. I think we will prevent its spread. There were three young ladies in the family exposed which we have isolated. How long before you think it will be safe for them to go among the public? The youngest one is about 12 years old, is a mute and attending school at Flint. How soon do you think it will be prudent for her to go there if there are no new cases? This girl has not been about her much but was in the house on Sunday, but has not been there since."

January 9, 1897, the Secretary of this Board wrote to Dr. Root, in answer to the above quoted letter, as follows:

"As the period of incubation in diphtheria is from two to eight days, it is quite probable that the case you refer to contracted the disease from the teacher who took dinner at the hotel in this city, on Wednesday, providing the teacher who had the sore throat, had diphtheria.

"Relative to the persons who were exposed to diphtheria and the length of time they should remain under surveillance, as the period of incubation as stated above is from two to eight days, therefore eight days should be the shortest period before releasing from quarantine or surveillance."

Diphtheria Alleged to have been Contracted in Harper Hospital, Detroit.

A. G. Sheets, M. D., health officer of Hadley township, Lapeer county, wrote to the Secretary of this Board relative to the source of contagium in a case of diphtheria in his jurisdiction, stating that a child was being treated for club foot in Harper Hospital, Detroit, and while there was taken sick with diphtheria. After her return home a sister contracted the disease and died.

A Probable Case of Streptococcus Diphtheria.

Dr. E. B. Patterson, health officer of Manistique village, Schoolcraft county, wrote to the Secretary of this Board, March 15, 1897, relative to a case of diphtheria in his jurisdiction, as follows:

"I am somewhat in doubt as to my diagnosis in the case, and question whether it was due to the presence of the Klebs-Löffler bacillus. A culture of membrane presented only one growth which could possibly be the specific germ, but showed many colonies of streptococci and staphylococci. I called it diphtheria because it seemed the only safe course. Both tonsils were covered with membrane, and a small patch appeared on pillar. There was intense oedema and inflammation of the whole pharynx; involvement of the cervical lymphatics, causing great external swelling; intense constitutional depression, and a characteristic diphtheritic temperature. The duration was longer than I ever saw in simple follicular trouble. No possible source of infection is known. The doctor helped me with a septic post mortem (empyema with perforation of the œsophagus) about a month ago, and suffered a slight local septicæmia from a scratch on the arm. Whether this could stand in causal relation to his subsequent trouble I cannot say."

Premises Possibly Infected with Diphtheria for Fifteen Years.

Geo. W. Thomas, health officer of Lamotte township, Sanilac county, wrote to the Secretary of this Board relative to the source of contagium of an outbreak of diphtheria in his jurisdiction, as follows:

"The first child is living yet, his throat has been lanced four times; we think he will get well now. The second child died in 24 hours from the time he was taken sick. I am going to disinfect the house on Wednesday, by order of the doctor. We do not know where it came from, except it came from the house, as there was a case of diphtheria in the same house fifteen years ago, and last year they repaired the house; we think it came from that, as the house was not disinfected, but the people moved out and sold to this man who owns it now. I quarantined the house and had the child buried in the night. I do not know of any other case of diphtheria near."

Diphtheria Possibly Contracted in a room Infected Years Before.

Jas. A. Fraser, M. D., health officer of Gaylord village, Otsego county, stated on his record sheet for 1897, as follows, relative to the source of contagium in his jurisdiction:

"From a case which occurred several years before in the same house; the paper was torn off the walls of two rooms a short time before the child came down with the disease. There was no other exposure so far as known, hence it is reasonable to attribute the outbreak to the former case."

ESTIMATED NUMBER OF OUTBREAKS AND CASES OF DIPHTHERIA PREVENTED AND LIVES SAVED BY ISOLATION AND DISINFECTION.

Tables 9 and 10 and the following diagram compare the average numbers of cases and deaths in outbreaks of diphtheria where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 9 it may be seen that during the eleven years, 1887-97, there were over six times as many cases and nearly six times as many deaths per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 10 it may be seen that during the year 1897 there were reported to the office of the State Board of Health 464* outbreaks of diphtheria, with 2,838 cases and 497 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 6,338 cases and 1,169 deaths, and taking from these respectively the cases (2,838) and deaths (497) which did occur, leaves 3,500 cases and 672 deaths indicated as prevented in these 464 outbreaks, by isolation and disinfection. By the same method of computation for each year the indicated saving during the eleven years, 1887-97, is 34,784 cases and 7,103 lives.

* *Definition of Outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended.—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of *years* require that outbreaks be counted as closed at the end of the *year*; while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

In the compilation of the reports for Tables 9 and 10 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

TABLE 9.—*Diphtheria.*—Exhibiting for the eleven years, and, for each of the eleven years 1887-97, the numbers of Reported Outbreaks, Cases and Deaths; also for this eleven-year period, the average number of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection was doubtful; in which both Isolation and Disinfection were neglected; in which both Isolation and Disinfection were enforced; and also the Numbers of Cases and Deaths Indicated to have been prevented by Isolation and Disinfection.

Years.	All Outbreaks. *				Isolation and Disinfection, or both, not Mentioned, or Statements Doubtful.				Isolation and Disinfection both Neglected.				Isolation and Disinfection both Enforced.				Indicated Saving of Cases and Lives by Isolation and Disinfection.	
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Cases.	Deaths.	
1887.....	398	2,321	561	202	732	190	60	822	195	78	198	51	73	198	51	73	198	51
1888.....	311	1,520	324	199	810	189	34	527	81	58	101	31	58	101	31	3,292	416	31
1889.....	376	1,986	418	254	1,314	280	41	478	108	63	98	14	63	98	14	2,398	570	14
1890.....	439	2,713	619	291	1,649	401	71	902	169	46	70	15	46	70	15	2,862	426	15
1891.....	532	2,905	643	366	1,777	389	79	944	194	70	157	33	79	157	33	3,392	666	79
1892.....	525	3,485	740	323	2,341	456	52	657	147	49	106	24	49	106	24	3,146	746	49
1893.....	536	3,133	746	303	1,681	392	74	1,020	232	65	159	45	65	159	45	4,253	1,296	65
1894.....	420	2,262	404	202	986	174	56	738	122	81	176	37	81	176	37	3,274	512	81
1895.....	388	2,292	425	178	1,102	209	45	610	119	70	146	28	45	70	28	2,969	599	45
1896.....	405	2,460	432	153	925	165	64	794	142	69	164	27	64	69	27	2,568	467	64
1897.....	464	2,838	497	165	916	137	100	1,366	252	93	225	46	93	225	46	3,500	672	93
Totals for the 11 years, 1887-97.....	4,794	27,984	5,809	2,636	14,233	2,952	676	8,858	1,811	742	1,599	351	742	1,599	351	{ 234,784 335,297 }	{ 47,103 47,135 }	351
Average for the 11 years, 1887-97	436	2,544	528	240	1,291	268	61	805	165	67	145	32	67	145	32	3,162	646	32
Average cases and deaths per outbreak for the 11 years, 1887-97.....	-----	5.83	1.21	-----	5.39	1.12	-----	13.20	2.70	-----	2.16	.48	-----	-----	-----	-----	-----	-----

* These do not include the cases and deaths in a number of the larger cities (foot-note to Table 11), because of the difficulty in determining the beginning and ending of an outbreak in those cities, in which the disease was present in some part of the city nearly all the year. † The numbers of cases and deaths in this double column are found by multiplying "All Outbreaks" for each year by the average number of cases, or deaths per outbreak in those outbreaks in which "Isolation and Disinfection both were neglected," for that year, and deducting from the result thus obtained, the cases or deaths, as the case may be, which were reported to have occurred that year. ‡ The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows: (1) the 34,784 cases and 7,108 deaths are totals of the columns representing cases and deaths saved as explained in the † foot-note. (2) The 35,237 cases and 7,135 deaths are obtained by multiplying the average numbers of cases and deaths per outbreak for the eleven years, 1887-97, (13.20 and 2.70 where isolation and disinfection were neglected), by the total number of outbreaks to find the numbers which would have occurred if all outbreaks had been neglected and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the eleven-year period.

ISOLATION AND DISINFECTION RESTRICTED SCARLET FEVER AND DIPHTHERIA IN MICHIGAN DURING THE 10 YEARS 1887-'96.

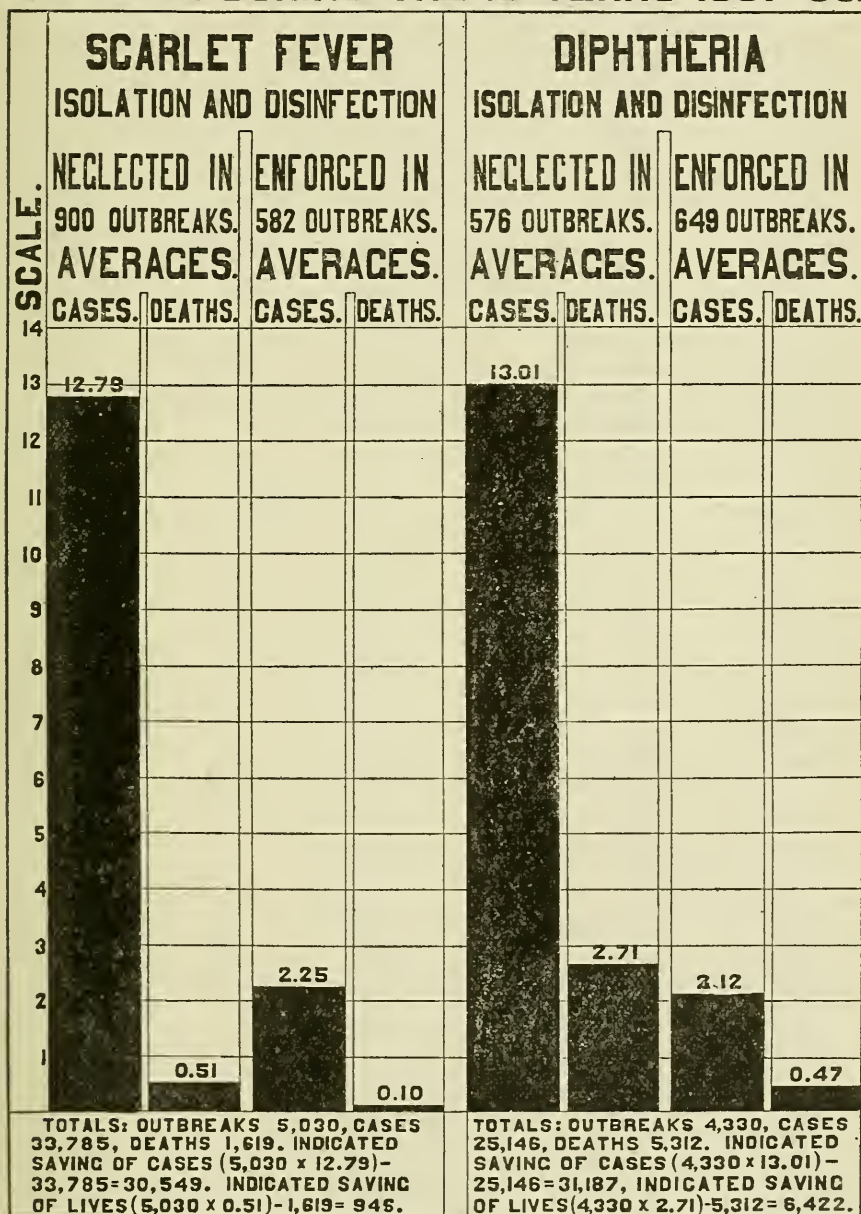


TABLE 10.—*Diphtheria in Michigan in 1897: Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 464 outbreaks reported; (2) in the 165 outbreaks in which it is doubtful whether or not Disinfection was enforced; (3) in the 16 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 22 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 26 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 22 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 100 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 93 outbreaks in which Isolation and Disinfection were both enforced.*

	(1) All outbreaks. (464 outbreaks.†)		(2) Isolation or Disinfection or both not mentioned or statements doubtful. (165 outbreaks.†)		(3) Disinfection enforced—Isolation doubtful. (16 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (32 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (36 outbreaks.)		(6) Isolation enforced—Disinfection neglected. (22 outbreaks.)		(7) Isolation and Disinfection both neglected. (100 outbreaks.)		(8) Isolation and Disinfection both enforced. (93 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals----	2,838	497	916	137	59	10	63	10	147	33	57	9	1,366	252	925	46
Averages.	6.12	1.07	5.55	.83	3.69	.63	2.13	.31	4.08	.92	2.59	.41	13.66	2.52	2.42	.49

* These do not include the cases and deaths in Detroit, Grand Rapids, Kalamazoo and Ishpeming, because of the difficulty in determining the beginning and ending of an outbreak in these localities, in which the disease was present in some part of the locality nearly all the year.

† These figures are graphically represented in the diagram opposite *this* page.

TABLE 11.—*Exhibiting the reported Period of Incubation, stated in days, in 194 cases of Diphtheria. Compiled from reports of Health Officers in Michigan for the year, 1897.*

Incubation period, —Days.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	20	21	24	25	28
Cases in each period	*5	†11	‡14	§5	¶20	||8	***44	††16	‡‡15	§§16	¶¶3	||5	1	***12	†††10	1	1	2	1	2	2

* In 1 of these cases it was reported as about 1 day.
† In 1 of these cases it was reported as about 2 days.
‡ In 1 of these cases it was reported as about 3 days.
§ In 1 of these cases it was reported as about 4 days.
¶ In 6 of these cases it was reported as about 5 days.
|| In 3 of these cases it was reported as about 6 days.
** In 15 of these cases it was reported as about 7 days.
†† In 10 of these cases it was reported as about 8 days.
‡‡ In 4 of these cases it was reported as about 9 days.
§§ In 9 of these cases it was reported as about 10 days.
¶¶ In 1 of these cases it was reported as about 11 days.
|| In 1 of these cases it was reported as about 12 days.
*** In 1 of these cases it was reported as about 14 days.
††† In 8 of these cases it was reported as about 15 days.

The average period of incubation of diphtheria in the 194 cases is 8.3 days.

TABLE 12.—*Exhibiting, relative to Diphtheria in Eighty-two Instances in Michigan in 1897, the Reported Period of Incubation, within certain Limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Instances.	Days.	Total of the Means.	Instances.	Days.	Total of the Means.	Instances.	Days.	Total of the Means.
1.....	1-7	4	1.....	3-10	6.5	1.....	8-9	8.5
4.....	1-30	62	3.....	4-5	13.5	6.....	8-11	57
1.....	2-3	2.5	2.....	4-10	14	2.....	8-12	20
1.....	2-4	3	1.....	4-14	9	1.....	9-12	10.5
2.....	2-5	7	6.....	5-6	33	1.....	9-21	15
1.....	2-6	4	1.....	6-7	6.5	2.....	10-12	22
1.....	2-10	6	1.....	6-9	7.5	1.....	10-20	15
1.....	2-17	9.5	1.....	7-8	7.5	1.....	10-35	22.5
1.....	3-4	3.5	18.....	7-9	144	1.....	12-14	13
1.....	3-5	4	3.....	7-10	25.5	6.....	14-21	105
1.....	3-7	5	1.....	7-11	9	1.....	14-30	22
4.....	3-9	24	1.....	7-28	17.5	1.....	21-28	24.5

The average of all the means, for the 82 instances, is 9.3 days.

*Ages of Greatest Prevalence of, and Mortality from, Diphtheria.**

The reports of local health officers in Michigan for the year 1897, stated the ages of 3,292 persons who were sick with diphtheria, and of 636 persons who died of that disease.

By Table 13 it may be seen that the highest per cent of sickness from diphtheria was in the second five-year period, from 5 to 9 inclusive, 34.5 per cent of all cases (where ages were stated) having occurred in that age-period. Although the greatest proportion of cases of diphtheria was in the second five-year period, the greatest proportion of deaths (43.7) from that disease was in the first five-year period.

TABLE 13.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Diphtheria, the per cent that the cases in each group were of all Cases of Known ages; the per cent that the Deaths in each group were of All Deaths at Known ages; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1897 which stated the ages.*

	Number and per cent of Cases and Deaths in certain Age-groups.																
Ages in groups of years.	All Known Ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50 and over.
No. of cases.....	+ 3,292	43	110	208	287	258	886	1,135	624	246	115	83	89	48	29	16	21
Per cent the cases in each group were of all cases of Known ages..	100	1.3	3.3	6.3	8.1	7.8	26.9	34.5	19.0	7.5	3.5	2.5	2.7	1.5	.9	.5	.6
No. of deaths.....	+ 636	20	49	75	66	68	278	217	80	24	10	7	10	2	1	4	3
Per cent the deaths in each group were of all cases in that group....	19.3	46.5	44.5	36.1	24.7	26.4	31.4	19.1	12.8	9.8	8.7	8.4	11.2	4.2	3.4	25.0	14.3
Per cent the deaths in each group were of deaths, Known ages..	100	3.1	7.7	11.8	10.4	10.7	43.7	34.1	12.6	3.8	1.6	1.1	1.6	.3	.2	.6	.5
Per cent the deaths in special groups were of all deaths, Known ages		43.7					90.4					9.7					

† Does not include those cases or deaths where the age was not stated.

Of the 3,292 cases of diphtheria mentioned in Table 13, 80.3 per cent occurred in persons under 15 years of age, while of the 636 deaths, 90.4 per cent occurred before the fifteenth year of age. Practically the same proportions are shown in Table 14, for the six years 1892-97, where the averages show that of the 14,865 cases, 77.5 per cent, and of the 3,050 deaths 90.1 per cent, occurred before the fifteenth year of age.

* In compiling data relative to ages, used in tables in this article, each age-period begins and ends on the birthday. For arranging the ages by single years or in age-periods the following method is pursued: From birth to one year old is the *first* year. Those one year old and less than two years old are classed in the second year. The third year of age includes all persons over two years and less than three years of age, and so on for each succeeding year.

In dividing the ages into five-year periods, the first period includes all ages from birth to five years, or all *under* five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.

TABLE 14.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Diphtheria in each of the years 1892-97; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths.—Compiled from all reports for the years 1892-97 which stated the ages.*

Year.		Total No. included.	Per cent of Cases and Deaths in certain Age-groups.											
			All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 Years and over.
1892.	Cases.....	2,065	100	22.0	32.7	21.0	9.5	5.3	3.5	2.3	1.8	0.8	0.6	0.5
	Deaths.....	476	100	34.9	36.6	18.1	4.8	2.3	1.5	0.8	0.6	0.2	0	0.2
1893.	Cases.....	1,864	100	25.1	31.3	22.1	10.1	6.1	4.1	2.7	1.7	0.9	0.7	0.6
	Deaths.....	435	100	38.2	35.6	13.3	7.4	2.8	1.6	0.7	0	0.2	0	0.2
1894.	Cases.....	2,178	100	23.1	31.3	19.4	10.3	4.7	3.9	2.8	2.1	1.2	0.7	0.6
	Deaths.....	412	100	35.7	36.9	15.8	6.1	1.7	1.7	0.7	1.0	0	0	0.5
1895.	Cases.....	2,460	100	30.3	32.0	17.1	6.9	4.7	3.1	2.7	1.1	0.8	0.7	0.6
	Deaths.....	521	100	50.7	28.6	13.2	2.9	1.7	1.0	0.4	0.6	0.4	0.2	0.4
1896.	Cases.....	3,006	100	24.0	33.9	19.8	8.7	4.3	3.1	2.3	2.0	1.0	0.4	0.5
	Deaths.....	570	100	45.1	34.4	12.8	3.0	2.4	0.7	0.7	0.5	0.0	0.0	0.4
1897.	Cases.....	3,292	100	26.9	34.5	19.0	7.5	3.5	2.5	2.7	1.5	0.9	0.5	0.6
	Deaths.....	636	100	43.7	34.1	12.6	3.8	1.6	1.1	1.6	0.3	0.2	0.6	0.5
1892-97.	Cases.....	14,865	100	25.2	32.6	19.7	8.8	4.8	3.4	2.6	1.7	0.9	0.6	0.6
	Deaths.....	3,050	100	41.4	34.4	14.3	4.7	2.1	1.3	0.8	0.5	0.2	0.1	0.4

TABLE 15.—*Exhibiting, by Sex, for each year of Age, and in certain Age-groups, the numbers of persons who died from Diphtheria during the year 1897, and the per cent the deaths in each Age-group were of deaths at all ages. (Compiled from such reports to the State Board of Health as stated the sex and age.)*

Sex.		Number and per cent of Deaths by Sex, in certain Age-periods.																														
Ages in Years, and groups of years.		All ages known.	Under 5.					5-9.					10-14.					15-19.					20-24.		25-29.		30 and over.					
			0-1.	1-2.	2-3.	3-4.	4-5.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19										
Males.	No. of Deaths, by single Yrs.	---	10	26	41	30	35	35	22	22	15	13	13	7	7	5	6	2	3	3	0	0										
	No. of Deaths, by Groups of Years	311	142					107					38					8					4	4	8							
	Per cent the Deaths in each age-group were of the total deaths among Males.	100	45.7					34.4					12.2					2.6					1.3	1.3	2.6							
	Average age at death, from Diphtheria	6.8																														
Females.	No. of deaths, by single Yrs.	---	10	23	34	36	33	37	21	22	15	15	10	11	9	5	7	7	5	2	2	0										
	No. of Deaths, by Groups of Years	325	136					110					42					16					6	3	12							
	Per cent the Deaths in each age-group were of the total deaths among Females.	100	41.8					33.8					12.9					4.9					1.8	.9	3.7							
	Average age at Death, from Diphtheria	7.7																														
Both sexes.	No. of Deaths, by single Yrs.	---	20	49	75	66	68	72	43	44	30	28	23	18	16	10	13	9	8	5	2	0										
	No. of Deaths by Groups of Years	636	278					217					80					24					10	7	20							
	Per cent the Deaths in each age-group were of the total deaths from Diphtheria in both sexes	100	43.7					34.1					12.6					3.8					1.6	1.1	3.1							
	Average age at Death from Diphtheria	7.25																														

TABLE 16.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Diphtheria, in Michigan, during the five years and each of the five years, 1893-7; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of non-fatal cases, Years.	No. of cases included.	Age.—In Periods of Years. Per cent of (non-fatal) Cases in each Period of age.														
				All Ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.	
1893.	Males.....	11.9	660	100	23.6	33.6	18.5	10.5	5.3	3.8	2.0	1.1	0.8	0.6	0.3	0	0	
	Females..	15.0	769	100	19.0	26.8	17.2	11.3	8.6	5.9	4.6	3.1	1.3	1.2	0.6	0.3	0.3	
1894.	Males.....	11.9	788	100	22	34	20	10	5	3	2	2	1	.25	.25	0	0	
	Females..	14.8	978	100	19	27	21	12	6	5	4	3	2	1.3	0.4	0.2	0.3	
1895.	Males.....	10.6	855	100	29.4	35.8	17.3	6.3	4.2	2.2	2.5	0.4	0.8	0.7	0.5	0	0	
	Females..	13.5	1,084	100	21.3	30.5	18.7	9.3	6.5	4.8	4.1	2.0	0.9	1.0	0.5	0.3	0.1	
1896.	Males.....	10.7	1,080	100	21.7	36.1	20.2	10.4	3.8	2.6	1.4	2.0	1.1	0.4	0.3	0.0	0.1	
	Females..	12.6	1,356	100	16.9	32.0	22.4	9.9	5.5	4.6	3.6	2.5	1.4	0.7	0.4	0.1	0.1	
1897.	Males.....	9.5	1,250	100	27.4	35.9	19.3	7.2	3.0	2.2	2.5	1.3	.6	.3	.3	0	0	
	Females..	12.2	1,406	100	18.9	33.4	21.6	9.4	4.8	3.5	3.4	2.1	1.4	.6	.6	.1	.3	
1893-7.	Males.....	10.9	4,633	100	24.8	35.1	19.1	8.9	4.3	2.8	2.1	1.4	.9	.5	.4	0	0	
	Females..	13.6	5,593	100	19.0	29.9	20.2	10.4	6.3	4.8	3.9	2.5	1.4	1.0	.5	.2	.2	

A study of Tables 16 and 17 shows facts similar to those shown in Tables 13 and 14, *i. e.*, that the average age for persons sick is greater than the average age of persons who die from diphtheria.

The average age for female patients is greater than for males in both fatal and non-fatal cases of diphtheria.

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TABLE 17.—*Exhibiting, by Sex and in certain Age-groups, the per cent of persons who died from Diphtheria in Michigan, during the six years and each of the six years, 1892-97; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from Diphtheria.											
Year.	Sex.	Average age. Years.	No. of Deaths included.	Ages.—In Periods of Years. Per Cent of Deaths in each Period of Age.							
				All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 Years and over.
1892.	Males.....	7.1	231	100	46	32	16	4	1	1	0
	Females.....	8.7	240	100	41	31	15	5	2	3	2
1893.	Males.....	8.1	207	100	43	34	9	10	3	1	1
	Females.....	8.8	228	100	34	37	17	5	2	3	1
1894.	Males.....	7.8	180	100	39	39	14	6	1	0	1
	Females.....	9.8	232	100	33	35	17	7	2	3	2
1895.	Males.....	6.4	250	100	57	26	13	2	1	0	1
	Females.....	8.3	271	100	45	31	14	3	3	2	3
1896.	Males.....	6.4	271	100	45	36	11	4	2	0	1
	Females.....	7.0	299	100	45	33	14	2	3	1	3
1897.	Males.....	6.8	311	100	46	34	12	3	1	1	3
	Females.....	7.7	325	100	42	34	13	5	2	1	4
1892-97.	Males.....	7.1	1,450	100	46	34	13	5	1.5	.5	1
	Females.....	8.4	1,595	100	40	34	15	5	2	2	3

AVERAGE DURATION OF DIPHTHERIA.—FATAL AND NON-FATAL CASES.

*Fatal Cases.*TABLE 18.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from Diphtheria, in Michigan, during the years 1893-7. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Diphtheria.										
Year.	Sex.	No. of cases included.	Duration of Sickness.—Per Cent of Deaths in each Period of Days.							
			All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35. and over.
1893.	Males.....	192	100	35	43	13	5	2	1	0
	Females.....	203	100	38	36	15	6	3	1	.5
1894.	Males.....	131	100	39	37	13	5	1	0	2
	Females.....	167	100	29	36	20	7	2	2	.6
1895.	Males.....	135	100	39	38	13	6	2	0	0
	Females.....	153	100	44	32	12	7	3	1	0
1896.	Males.....	139	100	53	26	9	8	2	0	1
	Females.....	155	100	59	24	8	5	3	0	1
1897.	Males.....	154	100	55	23	12	5	3	1	.6
	Females.....	169	100	53	30	11	4	0	1	0
1893-7.	Males.....	751	100	44	33	12	6	2	.4	.7
	Females.....	847	100	45	32	13	6	2	1	.3

By Table 18 it will be seen that the duration of sickness in fatal cases of diphtheria is very nearly the same for both sexes. It is a disease which proves rapidly fatal, as is shown by nearly half (45 per cent) of the fatal cases dying before the sixth day, and 77 per cent before the eleventh day of sickness.

TABLE 19.—*Exhibiting, by Sex of patient, the Duration (in days) of Non-Fatal cases of sickness from Diphtheria, in Michigan, during the five years and each of the five years, 1893-97. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Diphtheria.											
Year.	Sex.	No. of cases included.	Duration of Sickness.—Per Cent of Non-Fatal Cases in each Period of Days.								
			All Periods.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 days and over.
1893.	Males.....	442	100	9	35	25	14	9	4	2	2
	Females.....	517	100	8	37	27	12	8	4	2	2
1894.	Males.....	503	100	8	31	23	20	9	6	1	2
	Females.....	606	100	9	30	20	20	12	4	2	3
1895.	Males.....	394	100	8	32	29	16	8	4	2	2
	Females.....	531	100	10	32	32	14	6	3	2	4
1896.	Males.....	502	100	12	29	25	14	10	4	2	4
	Females.....	655	100	9	34	27	15	8	3	2	1
1897.	Males.....	706	100	10	32	31	12	8	4	1	1
	Females.....	797	100	10	36	23	14	10	4	.6	2
1893-97.	Males.....	2,247	100	9	32	27	15	9	4	2	2
	Females.....	3,106	100	9	34	26	15	9	4	2	2

In Table 19 it may be seen that in non-fatal cases of diphtheria for the five years, 1893-97, the duration of sickness in five-day periods was nearly the same in both sexes; that 68 per cent of the males and 69 per cent of the females recovered before the fifteenth day of sickness.

OUTBREAKS OF DIPHTHERIA IN WHICH RESTRICTIVE MEASURES WERE NEGLECTED.—RESULTS.

Below is given in substance the correspondence between this office and a few of the local health officers in Michigan who reported during the year 1897, relative to neglected outbreaks of diphtheria in their jurisdictions.

Neglected Outbreak of Diphtheria in Fruitport Township, Muskegon County.

J. C. Ford, health officer of Fruitport township, Muskegon county, in reporting relative to an outbreak of diphtheria in his jurisdiction, stated that the cases were very mild in character and were not at first recognized and treated as diphtheria, with the result that four cases occurred in one family. Mr. Ford's letter was as follows:

"I have to advise you of the breaking out of diphtheria in the family of Mrs. R— of this township, a widow with four children who have all been attacked with the disease

in a mild form. The first taken was the eldest boy, Roy—, aged 13. He came down November 30, but is all right again now. Second child aged 5 years, Harry —, attacked December 4. Now nearly well again. Third child, Laura, aged 3 years, December 8, nearly recovered. Fourth boy, Rolla, taken December 14, with badly swollen throat, but the attending physician says he apprehends no very serious results. The family are kept separate from other families and will not be allowed to go from their home until the physician reports the danger over.

"The delay of reporting this case has been in consequence of the doctor being uncertain whether the malady was anything more than a severe sore throat, but the writer had the regular county physician make an investigation today, and it is now decided that the children have all had diphtheria in a mild form."

There had been two cases with one death from diphtheria in this locality only one month before the cases mentioned in the above quoted letter. One of these cases, Mrs. F——, died and the permit for burial stated throat trouble and heart failure as the cause of death. November 1, her husband was sick with diphtheria. The first case (Roy) in the above mentioned family, should have been treated as a probable case of diphtheria, and isolated; for by isolating the first case possibly all of the others could have been avoided, as the last case did not take sick for over two weeks after the first one was taken with diphtheria.

Neglected Cases of Membranous Croup Result in the Spread of Diphtheria.

John F. Hicks, M. D., health officer of the city of Menominee, wrote to the Secretary of this Board, March 8, 1897, relative to the neglect of physicians to report and isolate cases of membranous croup, with the result that the disease spread and a number of fatalities occurred. Dr. Hicks' letter is as follows:

"I ask our physicians to report all cases of membranous croup. I order isolation, quarantine and placard houses, and after recovery or death fumigate the premises.

"One of our physicians refuses to report such cases, claiming that membranous croup is not a contagious disease. During the past few weeks a number of deaths in the practice of this physician have occurred—cause given, membranous croup. None of them were reported, public funerals were held, neighbors freely visited house, and in one case, that of a child five or six years old, the funeral was not held until four days after death. Neighbors in the meantime going out and in at will. At the funeral the house was crowded; the people having been assured by this physician that membranous croup was not contagious or dangerous. Diphtheria is prevailing here, and I am somewhat fearful that it may become epidemic.

"I believe these cases of croup to be diphtheria and ought to be quarantined and isolated, as harm may result if not. Please advise me what steps to take."

In answer to the above-quoted letter from Dr. Hicks, a "blue letter" relative to the restriction of diphtheria was sent to him, inclosing resolutions adopted by this Board relative to the treatment of all cases of sore throat as suspicious until proved otherwise.

The following is a copy of the hektographed resolutions sent to Dr. Hicks and other health authorities who report membranous croup:

IN ALL CASES OF SORE THROAT, PRECAUTIONS SHOULD BE TAKEN.

Resolutions adopted by the Michigan State Board of Health, January 10, 1888:—

"Whereas, It is often difficult to recognize mild cases of diphtheria, or to distinguish such cases from a simple tonsillitis, pharyngitis or laryngitis; and

"Whereas, Such mild cases of diphtheria often communicate a dangerous and fatal form of diphtheria;

"Resolved, That it is the duty of physicians and householders in reporting diseases dangerous to the public health, and of local health authorities in their efforts to restrict such diseases, in every case, to give to the public safety the benefit of the doubt, and in localities where diphtheria exists to regard cases of acute sore throat as suspected cases of diphtheria;

"Resolved, That suspected cases of dangerous diseases should be reported, and precautionary measures should be taken."

February 7, 1889, the following was unanimously adopted:

"Whereas, It is often impossible to discriminate between cases of diphtheria and membranous or inflammatory croup; and

"Whereas, Modern researches point to a probable common origin of these diseases;

"Resolved, That in the opinion of this Board, membranous or inflammatory croup should be classed with diseases communicable and dangerous to the public health, and should be reported as such, and the same precautions should be taken in cases of this disease, as regards isolation and disinfection, as in cases recognized as diphtheria."

Sickness and Death from Diphtheria follow Neglect to Properly Isolate the First Case.

Fred S. Ruggles, M. D., health officer of Byron village, Shiawassee county, wrote to the Secretary of this Board, February 19, 1897, relative to neglect in isolating a case of diphtheria long enough to insure freedom from infection,—with the result that several other cases and one death followed exposure to the first case. Below is given the substance of Dr. Ruggles' letter:

"I wish to say a word as to the source of infection into my jurisdiction: A Miss R——, of Vernon, was employed here among about forty other young ladies, in picking beans. About the first of December she was taken with diphtheria and returned in three or four weeks to her work here. The girls at work with her state that she had sores about her nose, and that she 'stunk' as they state it. Several of the girls were taken sick with what was called tonsillitis. I did not see them, no report being made to me; but the attending physician admitted to me that there were membranes on the tonsils; others I personally know suffered from paralysis of the throat, after apparent recovery. About the 26th of January, I was called to attend the three year old child of C. J. W., who presented a well developed case of diphtheria and lived but a few days.

"Upon inquiry I found the mother of the child had called, about a week before at the house where Miss R—— roomed, and that Miss R—— had entered the room and kissed her little girl. Although this must have been about six weeks after the R. girl was permitted to go out, yet Mr. W's little girl undoubtedly contracted the disease from her. This certainly ought to teach local boards of health to be very cautious about permitting those who have recovered from diphtheria from going among others, whatever the time may be, which has elapsed since apparent recovery."

Where it is possible to make the proper examination, cases of true diphtheria should only be released from quarantine when bacteriological examination of the mucus from the patient's throat fails to show the specific germ.

Diphtheria Contagium Alleged to have been Carried from Chicago to Marquette.

Dr. J. H. Dawson, health officer of the city of Marquette, wrote to the Secretary of this Board, September 7, 1897, relative to the source of contagium in an outbreak of diphtheria in his jurisdiction as follows:

"Since sending you my final report of diphtheria in this city recently, another case has developed in my own practice which is especially interesting in consideration of the probable source of infection.

"On Sept. 1 I was called to see a child in a family that I am intimately acquainted with. The house is quite isolated and the mother is a person who remains at home almost continually and as a matter of fact she had not been away from her home in some weeks previous to the development of the diphtheria in her twelve months old baby. The child had been sick some days before I saw it. * * * A culture developed Klebs-Loeffler bacilli of the healthiest and most vigorous character possible. Careful inquiry as to the possible source of the infection revealed nothing at first, but on noticing a strange child playing with the older children of the family I inquired where she was from and they informed me that she had come from Chicago some two weeks previous with her mother to make them a visit, and reference to the child reminded them of the fact, evidently for the first time, since her arrival, that she had suffered from a severe attack of diphtheria in Chicago some time last winter or in the early spring. I was satisfied in my own mind at once that that was the source of the infection. The children were sent away from home to be under their grandmother's care during the presence of the unwelcome diphtheria in their house, and none of them have developed throat symptoms up to the present time. The baby contrary to my expectations, and I may also say my experience, threatens to recover. I trust that I may be able to report the recovery of this case later."

The child did recover.

This is perhaps an instance where city health officials failed to completely disinfect some infected article after the recovery of the case of diphtheria in Chicago, with a consequent spread of the contagium to a

locality in Michigan; although there is a possibility that the child from Chicago carried the germs in its throat during the several months which elapsed after its sickness in Chicago.

Neglected Outbreak of Diphtheria in Spalding Township, Menominee County.

An outbreak of diphtheria occurred in Spalding township, Menominee county, which lasted from June 13 until November 11, 1897, and in which there were 21 cases with 5 deaths reported. Below is given a part of the correspondence which passed between P. H. S. Lynch, M. D., health officer of Spalding township, and the Secretary of this Board, relative to this outbreak, and measures which should have been used for its restriction. August 2, Dr. Lynch wrote to the Secretary of this Board as follows:

"We have had altogether four families ill with diphtheria, in Spalding township. I will give you a history of those in my final report. Please send me blanks for same.

"I have at present one family quarantined, and vicious neighbors of same are stirring up trouble by saying that the said family has only sore throat. I wish to make an example of one or more of these people. Will you instruct me how? Can I not have them arrested and prosecuted?

"We are doing everything possible here to stamp out the disease."

August 5, the Secretary of this Board answered the above-quoted letter as follows:

"Relative to the neighbors who say that the family has only sore throat, so long as they do not interfere with or violate any law or any of your orders made in accordance with the law, I do not think that you can do anything with them, as talk is cheap and you cannot prevent them from talking, but should anyone violate or interfere with the law then you should report such violations to the Supervisor, whose duty it is to prosecute for all such violations, the prosecuting attorney to conduct the suit if so requested. Herewith I enclose a marked pamphlet bearing upon that subject.

Dr. Lynch wrote to this office again, October 20, as follows:

"About four weeks ago a case of diphtheria occurred in this village (which with the villages of Spalding, Wilson and Klonan) is located in Spalding township. This case was not reported to me nor to anyone else, through the failure of Dr. — of this village. The cases I report today are believed to have been caused by allowing the families infected to run about." * * * "One case in each of two Railroad section houses occurred and we rented a house and isolated those cases, fumigated the section house rooms and every vestige of clothing in them and on each of the occupants. There were about 40 people in those houses; 26 boarders (men). I called on the deputy sheriff here and had him go with me, as those men were disposed to be rebellious. We had to threaten arrest, but were not obliged to make any. We have an attendant watching the house infected in Spalding (village) where eight in family have had it, and the deputy sheriff has charge of the pest house we hired here. One thing is certain—we should have a building here for the purpose of isolating contagious diseases.

"Here are questions I request you to reply to: How long shall I keep up the placard after the last one sick gets well or is buried? How soon after the sick one gets well shall I disinfect? Is it my duty to investigate a rumor of diphtheria at or in any place in my township? When I do my duty, as I am trying hard to do, and I go into a house to disinfect and fumigate, if the family or owner refuses to pay for my work of disinfection, must not the county pay me?

"How would you advise the use of Permanganate of Potash? I have a lot of it and am not sure as to the best way to use it. * * * I tell these people here that a carbolic spray can not be depended on as a disinfectant. Please state your opinion in a letter to me."

In reply to the above-quoted letter the following was sent from this office, October 22, 1897:

"Your letter of October 20, relative to diphtheria is before me, for which please accept thanks.

"Relative to the placarding, as the bacillus which is the specific cause of diphtheria has been found in the throat several weeks after apparent complete recovery and as the duration of infectiousness is now proved to be at least three weeks, therefore three weeks should be the shortest period of isolation after apparent complete recovery, unless you are able to prove the absence of the bacillus by a bacteriological examination, and the placard should remain so long as there is any one isolated.

"Relative to disinfection, the final disinfection should not take place until after the expiration of the three weeks mentioned above.

"Relative to your investigating a rumor of diphtheria, the law, Act 137, laws of 1883, says that whenever you have received reliable notice, or *otherwise have good reason to believe*, it is your duty to immediately investigate.

"Relative to the disinfectants, the law requires the health officer to disinfect, which implies that the local board of health (and not the householder or attending physician) must supply the disinfectants. The disinfection is for the benefit of the public, and therefore the board of health should supply the disinfectants.

"Relative to the use of Permanganate of Potash, this office does not deal with the treatment of diseases, but deals only with the restriction and prevention of diseases dangerous to the public health, by means of isolation and disinfection, and relative to its use as a public disinfectant I do not regard it as of any use whatever for that purpose.

"Relative to the use of a carbolyzed spray, as stated before this office does not deal with the treatment of diseases, but if the spray was used in the throat, it might be of some use, but as a means of public disinfection or used as a spray in the room I do not regard it of any great value or to be relied upon as a means of disinfection."

The Need of Isolation Hospitals.

Dr. Lynch wrote to the Secretary of this Board again, December 8, as follows:

"Find my final report of outbreak of diphtheria here, which I made out today. * * * Of one thing I am positive—we need isolation hospitals very badly in all localities. Take for instance a case of contagious disease in a large family—a small house—probably two rooms and a sort of garret. Now if we had an isolation hospital we could take away the infected one and fumigate and immunize the others. We have had an unoccupied house here for two cases, and this saved us quarantining two Railroad section houses, where there were over 50 inmates altogether. We took out the infected ones and subjected every other inmate to a rigid disinfection (made them change clothes and scrub with corrosive sublimate solution, put clothing in a room, hung loosely and burned seven pounds of sulphur therein). Result—no other case occurred. I have also used P. D. and Co.'s immunizing antitoxin in many cases where only the one that had the disease became ill."

Continued Presence of Diphtheria in Calumet Township, Houghton County.

Diphtheria was reported by Robert M. Wetzel, health officer of Calumet township, Houghton county, as present in his jurisdiction during every month of the years 1896 and '97 and continued into the year 1898. This long-continued prevalence of the disease did not seem right to the Secretary of the State Board of Health, so on March 18, 1897, he wrote to Mr. Wetzel as follows:

"Relative to the dangerous communicable diseases, pamphlets are issued by this office bearing upon the restriction and prevention of those diseases, and it is believed that if they are distributed to the *neighbors of families* in which the disease is present the documents will be most likely to be read with interest and profit. One of the objects in distributing the documents, is the education of the people in order to get their co-operation with the local health authorities, for the prevention and restriction of these diseases. Whenever the first occurrence, or a new outbreak, of any dangerous communicable disease is reported to this office, pamphlets are sent to the health officer with the request that he distribute them where they will do the most good. However, your jurisdiction seems to be an apparent exception to this rule, for the reason that most of the dangerous communicable diseases are nearly always present in your jurisdiction. This being the fact, it seems to me that the pamphlets issued by this Board should be more freely distributed, and I write to you asking you if you will not co-operate with this Board in distributing the documents? Under a separate cover I mail to you a few sets of the documents, and if you will use them I will be glad to send you a supply. Kindly let me hear from you upon this subject, and oblige."

Robert M. Wetzel, the health officer of Calumet township, replied to the above-quoted letter, March 22, as follows:

"Your letter of the 18th inst., relative to the almost constant presence of dangerous communicable diseases in this jurisdiction, and also asking for the co-operation of the people with the local health authorities by the distribution of pamphlets more freely, has been received.

"In reply I shall endeavor to present to you the conditions as they exist in this township, with reference to the work done by the local Board of Health, as briefly as possible.

"Calumet township has an estimated population of 22,000 inhabitants, represented by 24 nationalities; Austrians, Italians, Finlanders and Scandinavians predominating. Of the children attending the public schools less than 10 per cent are of American parentage.

"Within a half mile of each other situated in this township, are two incorporated villages—the village of Red Jacket and the village of Laurium, each of which has its

local board of health. Just on the border of this township on the south are the Osceola and Tamarack locations which are in Osceola township.

"All these people from the localities referred to, do all their business in Red Jacket (a little of it is done at Laurium). All the places of amusement and most of the foreign churches are in Red Jacket.

"I mention this so that you may more readily understand how much these people are brought in contact with each other.

"Many of the families are scrupulously clean in their homes; we also have very many where filth beggars description. Several large families will be found huddled together in a house scarcely large enough to accommodate one family comfortably. In some instances families of six or more persons have but two rooms to live in.

"Every house infected with diphtheria is watched 24 hours each day from the time reported until two days after fumigation. The persons of the household infected are kept isolated in every sense of the word. The father and all other members of the family or household who go out to work are kept at home until the case has recovered and the house fumigated. We quarantine scarlet fever the same as diphtheria, and use the same precautionary measures, though probably not so strictly enforced.

"Typhoid fever is reported often. This disease is probably often caused by an unsanitary house or cellar, and sometimes from drinking swamp water (or water other than the regular supply from Lake Superior), which men drink sometimes when employed in the woods.

"I have always made use of the pamphlets sent me for distribution by giving them to neighbors of infected houses, urging that they be carefully read and studied, but it is my impression the people make very little use of them.

"Much more satisfactory results could be obtained if these pamphlets could be supplied in the foreign languages—Swedish, French, Italian, Polish, etc.

"All pamphlets you may send me will be distributed as new cases occur, the same as has been done in the past. We have been using an old supply of these pamphlets for the past year or two, but they are all used now.

"Every thing considered, I think our efforts at restriction result in much prevention of disease. We labor under many disadvantages, and work hard enough to secure more flattering results than we do."

RESTRICTION OF DIPHTHERIA.

Restrictive Measures Observed in an Outbreak of Diphtheria in the city of Coldwater.

T. G. Turner, M. D., health officer of the city of Coldwater, reported relative to the restrictive measures observed in an outbreak of diphtheria which occurred in his jurisdiction, as follows:

"Enclosed please find weekly report of communicable diseases. At present no known cause exists in this jurisdiction. The decease of Mrs. Mertie Smith closed this last of this recurrence of diphtheria. It appears that she was taken ill at the house marked 1 in the maps I have of the city, and was conveyed to her father-in-law's residence, marked 2, where she died." * * * * "The death occurred February 1, at 9 a. m., and the burial was at 3 p. m. same day; no public funeral permitted. Two dogs and one cat, that were permitted by the parents to lie upon the bed with the patient, were killed. A large quantity of bedding and clothing, lounge, carpet, etc., were destroyed by fire, although fumigation by sulphur was made in both houses, and this afternoon another mess will be disposed of by fire. Soap, water, brushes and clothing, with necessary food have been supplied. Three houses have been quarantined, the residents having visited Mrs. Smith during her illness. One person has been arrested for breaking the quarantine, and if no punishment is inflicted then I give up this office, for to try any other method of isolation and restriction would be useless. I shall use, after the cleaning and disinfection, Johnson's lamp for the production of Formaldehyde." * * * I have your letter and feel encouraged to go on but it demands a deal of patience and a severe control of one's temper, with a sanguine wish for autocratic and despotic powers in health matters."

SCARLET FEVER IN MICHIGAN.—YEAR ENDING DECEMBER 31, 1897.

During the year ending December 31, 1897, there were reported to the Secretary of the State Board of Health 359 outbreaks of scarlet fever in 293 localities in Michigan, which resulted in 2,482 cases and 115 deaths. Notwithstanding the marked improvement which has occurred both in promptness and accuracy of reports of local health officials to the central office, it is probable that not all cases of and deaths from scarlet fever are yet reported.

Some of the purposes of this compilation are stated on a preceding page of this Annual Report, in the article on "Communicable Diseases in Michigan in 1897."

Scarlet Fever in 1897, Compared with Previous Years.

From year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by local health authorities throughout the State to furnish in their reports the information desired by the State Board. These facts, together with the constantly increasing population, make it difficult to determine the exact decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom; and these facts should be borne in mind in referring to Table 1. While these facts considered alone might reasonably be expected to produce a constant increase in the reported prevalence of the disease, Table 1 shows that such increase has not occurred in the last four years, the reported cases and cases per outbreak having decreased, and in the last three years markedly so.

On page 202 of the Annual Report of this Board for 1897, Table 2, exhibiting the number of deaths from scarlet fever, per 100,000 persons living, reported to the Secretary of State, represents the annual fluctuation of the total death-rate from scarlet fever in Michigan during the 29 years 1868-96. A diagram graphically representing this fluctuation for the 24 years, 1868-1891, is printed on page 234 of the Annual Report of this Board for 1895.

Distribution of Scarlet Fever by Divisions and Counties During 1897.

Tables 2 and 3 exhibit in different ways the distribution of scarlet fever in Michigan in 1897. The map which follows Table 3, shows for each county of the State the sickness and death-rates per 10,000 inhabitants, the number of localities where the disease was present during the year, and the number of outbreaks which occurred in those localities. The map enables the reader to see the locations of the several counties.

TABLE 1.—SCARLET FEVER IN MICHIGAN.—*Numbers of Reported Outbreaks, Localities (in which they occurred), Cases and Deaths; Average Numbers of Cases and Deaths per Outbreak, and the Per Cent of Cases which proved fatal, as reported for each of the 16 years, 1882-1897; with the departure of the same for 1897 from 1896, and from the Average of the same for the 13 years, 1884-96.*

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Av. No. of Cases per Outbreak.	Reported Deaths.	Av. No. of Deaths per Outbreak.	Deaths per 100 Cases.
1882.....		83	849		138		*16.0
1883†.....	164	150	1,802	11.	248	1.51	*14.0
1884‡.....	324	296	2,476	8.	230	.71	9.0
1885.....	356	337	2,750	8.	187	.53	7.0
1886.....	386	302	3,046	8.28	275	.71	9.0
1887.....	353	297	3,400	9.63	314	.89	9.0
1888.....	381	315	2,989	7.85	200	.52	6.7
1889.....	421	382	3,535	8.40	166	.39	4.6
1890.....	481	417	3,835	7.97	162	.34	4.2
1891.....	605	516	6,212	10.27	286	.47	4.6
1892.....	625	548	7,075	11.32	487	.78	6.9
1893.....	675	566	6,065	8.99	415	.61	6.8
1894.....	678	547	5,500	8.11	203	.30	3.7
1895.....	574	462	3,908	6.81	125	.22	3.2
1896.....	406	332	2,646	6.52	81	.20	3.1
1897.....	359	293	2,482	6.91	115	.32	4.7
Average for thirteen years, 1884-96.....	482	409	4,110	8.47	241	.51	6.0
Departure of 1897 from 1896.....	-47	-39	-164	+39	+34	+12	+1.6
Departure of 1897 from the average for 13 years, 1884-96	-23	-116	-1,628	-1.56	-126	-19	-1.3

* Probably in some instances only the fatal cases were reported.

† Use of the blank form "M" for weekly reports was begun in May, 1883.

‡ Use of the annual reports of health officers in compiling scarlet fever for communicable disease article was begun in 1884.

Decreased Fatality from Scarlet Fever.

In the last column in Table 1, on page 155 of this Report, it is shown that since 1894 there has been a lessened case mortality rate from diphtheria, and in a foot-note this was attributed to the use of antitoxin, which began about that time. From the last column in Table 1 in this article it may be seen that there has been a marked decrease in the case mortality rate from scarlet fever, in about the same years, since 1894. This decrease cannot be due to antitoxin, because none is yet known for scarlet fever; and the decrease may be because of more complete reports of all the cases of scarlet fever, including a larger proportion of those that were mild than previously, thus reducing the "Deaths per 100 cases"; but it is believed that the type of the scarlet fever during the past few years has been milder than in former years.

TABLE 2.—*Exhibiting the Estimated Population* of Michigan for the year 1897, by tiers of counties (Upper Peninsula as one tier); also the number of cases of and deaths from Scarlet Fever REPORTED from each of the divisions for 1897, and the number of cases and deaths per 10,000 population of each division.*

Counties in Groups, most Northern ones First.			Estimated Population, 1897.*	Reported Cases of Scarlet Fever, 1897.	Reported Cases per 10,000 of Population.	Reported Deaths from Scarlet Fever, 1897.	Reported Deaths per 10,000 of Population.
State.....			2,352,455	2,482	10.55	115	.49
Upper Peninsula.....	Alger	Mackinac.	226,143	89	3.94	4	.18
	Delta.	Chippewa.					
	Schoolcraft.	Keweenaw.					
	Luce.	Marquette.					
	Houghton.	Iron.					
	Ontonagon.	Menominee.					
Eleventh tier of counties..	Gogebic.	Dickinson.	46,408	145	31.24	6	1.29
	Baraga.						
	Emmet.	Cheboygan.					
Tenth tier of counties.....	Charlevoix.	Presque Isle.	52,218	59	11.30	2	.38
	Leelanau.						
	Antrim.	Alpena.					
Ninth tier of counties.....	Otsego.		46,497	4	.86	2	.43
	Montmorency.						
	Benzie.	Crawford.					
Eighth tier of counties.....	G'd Traverse.	Oscoda.	69,267	19	2.74	3	.43
	Kalkaska.	Aleona.					
	Manistee.						
Seventh tier of counties..	Wexford.	Ogemaw.	164,859	70	4.25	0	0
	Misaukee.	Iosco.					
	Roscommon.						
Sixth tier of counties.....	Mason.	Gladwin.	95,458	15	1.57	0	0
	Lake.	Bay.					
	Osceola.	Huron.					
Fifth tier of counties.....	Clare.	Arenac.	251,793	336	13.34	6	.24
	Oceana.						
	Newaygo.	Midland.					
Fourth tier of counties.....	Mecosta.		395,525	492	12.44	19	.48
	Isabella.						
	Muskegon.						
Third tier of counties.....	Montcalm.	Tuscola.	233,901	236	10.09	11	.47
	Gratiot.	Sanilac.					
	Saginaw.						
Second tier of counties..	Ottawa.	Shiawassee.	537,157	816	15.19	59	1.10
	Kent.	Genesee.					
	Ionia.	Lapeer.					
First tier of counties.....	Clinton.	St. Clair.	233,301	201	8.62	3	.13
	Allegan.	Livingston.					
	Barry.	Oakland.					
	Eaton.	Macomb.					
	Ingham.						
	Van Buren.						
	Kalamazoo.	Washtenaw.					
	Calhoun.	Wayne.					
	Jackson.						
	Berrien.						
	Cass.	Hillsdale.					
	St. Joseph.	Lenawee.					
	Branch.	Monroe.					

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the office of the State Board of Health.

The sickness-rates and death-rates shown in the accompanying map (Plate 993) agree with those in Table 3, except that in some instances but one decimal place could be used on the map, while in the table the sickness and death-rates are carried out to the second decimal place.

Sickness-rates from Reported Scarlet Fever by Divisions and Counties.

Table 2 exhibits the latitudinal distribution of scarlet fever reported throughout the State, by tiers of counties; all the counties of the Upper Peninsula considered as one tier. By this table (2) it appears that the

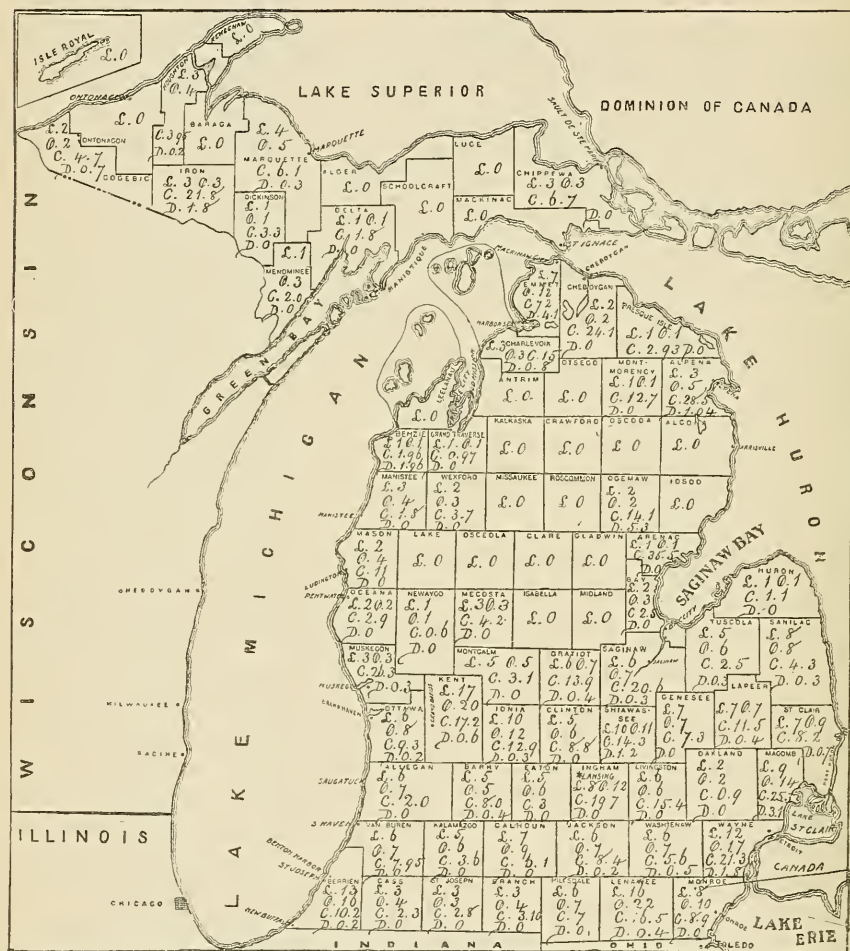
TABLE 3.—*Numbers of Cases and Deaths reported from Scarlet Fever per 10,000 persons living in each county in Michigan during the year 1897. (Compiled from reports of health officers, clerks, etc.)*

State and Counties.	Estimated Population of Michigan for 1897.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated Population of Michigan for 1897.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,352,455	2,482	115	10.55	.49						
Alcona.....	5,425	0	0	0	0	Keweenaw...	2,873	0	0	0	0
Alger.....	1,495	0	0	0	0	Lake.....	5,441	0	0	0	0
Allegan.....	39,360	8	0	2.03		Lapeer.....	28,628	33	1	11.53	.35
Alpena.....	19,319	55	2	28.47	1.04	Leelanau....	10,624	0	0	0	0
Antrim.....	13,938	0	0	0	0	Lenawee.....	48,611	80	2	16.46	.41
Arenac.....	7,888	28	0	35.50		Livingston...	20,121	31	0	15.41	0
Baraga.....	5,129	0	0	0	0	Luce.....	2,268	0	0	0	0
Barry.....	23,636	19	1	8.04	.42	Mackinac....	6,792	0	0	0	0
Bay.....	64,973	16	0	2.46	0	Macomb.....	32,818	83	10	25.29	3.05
Benzie.....	10,183	2	2	1.96	1.96	Manistee....	27,527	5	0	1.82	0
Berrien.....	48,898	50	1	10.23	.20	Marquette...	39,454	24	1	6.08	.25
Branch.....	25,769	8	0	3.10	0	Mason.....	19,950	22	0	11.03	0
Calhoun.....	50,450	31	0	6.14	0	Mecosta.....	21,503	9	0	4.19	0
Cass.....	21,343	5	0	2.34	0	Menominee...	24,646	5	0	2.03	0
Charlevoix...	10,012	18	1	14.99	.83	Midland.....	15,139	0	0	0	0
Cheboygan...	15,336	37	0	24.13	0	Missaukee....	8,385	0	0	0	0
Chippewa....	17,799	12	0	6.74	0	Monroe.....	33,814	30	0	8.87	0
Clare.....	8,290	0	0	0	0	Montcalm....	35,299	11	0	3.12	0
Clinton.....	26,077	23	0	8.82	0	Montmorency	3,151	4	0	12.69	0
Crawford....	2,521	0	0	0	0	Muskegon....	35,307	93	1	26.34	.28
Delta.....	22,211	4	0	1.80	0	Newaygo.....	18,112	1	0	.55	0
Dickinson...	15,261	5	0	3.28	0	Oakland.....	43,749	4	0	.91	0
Eaton.....	33,011	10	0	3.03	0	Oceana.....	17,275	5	0	2.89	0
Emmet.....	12,231	88	5	71.95	4.09	Ogemaw.....	5,679	8	3	14.10	5.28
Genesee.....	41,395	30	0	7.25	0	Ontonagon...	9,211	0	0	0	0
Gladwin.....	5,419	0	0	0	0	Osceola.....	17,859	0	0	0	0
Gogebic.....	14,771	7	1	4.74	.68	Oscoda.....	1,733	0	0	0	0
Gratiot.....	20,635	2	0	.97	0	Otsego.....	5,186	0	0	0	0
Hillsdale....	28,857	40	1	13.86	.35	Ottawa.....	41,877	39	1	9.31	.24
Houghton...	29,981	21	0	7.00	0	Presque Isle..	6,829	2	0	2.93	0
Huron.....	50,630	20	1	3.95	.20	Roscommon..	1,375	0	0	0	0
Ingham.....	41,206	81	0	19.66	0	Saginaw.....	81,528	168	2	20.61	.25
Ionia.....	36,334	47	1	12.94	.28	Sanilac.....	34,962	15	1	4.29	.29
Iosco.....	10,177	0	0	0	0	Schoolcraft..	8,109	0	0	0	0
Iron.....	5,494	12	1	21.84	1.82	Shiawassee...	34,281	49	4	14.29	1.17
Isabella.....	23,430	0	0	0	0	St. Clair.....	55,983	46	4	8.22	.71
Jackson.....	47,663	40	1	8.39	.21	St. Joseph...	24,885	7	0	2.81	0
Kalamazoo...	44,143	16	0	3.62	0	Tuscola.....	35,840	9	1	2.51	.28
Kalkaska....	6,000	0	0	0	0	Van Buren...	31,447	25	0	7.95	0
Kent.....	130,950	225	8	17.18	.61	Washtenaw...	44,483	25	2	5.62	.45
						Wayne.....	318,971	679	56	21.29	1.76
						Wexford.....	16,124	6	0	3.72	0

* Population estimated by average annual increase, arithmetical method, based on U. S. Census of 1890 and the State Census of 1894; computed in the office of the State Board of Health.

DISTRIBUTION OF SCARLET FEVER IN MICHIGAN IN 1897.

BY COUNTIES. THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.



S. = Localities; O. = Outbreaks; C. = Cases per 10,000 population; D. = Deaths per 10,000 population.

greatest reported prevalence of scarlet fever was in the eleventh tier, where the sickness-rate was 31.24 cases per 10,000 inhabitants. The second tier with 15.19, and the fifth tier with 13.34 cases per 10,000 inhabitants, had the next highest sickness-rates. From the ninth tier only four cases were reported, giving a sickness-rate of .86 of one case per 10,000 inhabitants.

Table 3 shows that the greatest sickness-rate, by counties, from reported scarlet fever, was in Emmet county, where the ratio of cases to population was 71.95 per 10,000. This was more than double the sickness-

rate of any other county—Arenac, with 35.50 cases per 10,000 inhabitants, having the next highest rate.

In counties from which sickness from scarlet fever was reported, the lowest rate was in Newaygo county, which had .55 of one case per 10,000 inhabitants. In twenty-four other counties where scarlet fever was reported, the sickness-rates were less than one-half the average sickness-rate for the State. Of these counties, Oakland, with .91, and Grand Traverse, with .97, of one case per 10,000 inhabitants, ranked lowest. From twenty-three counties, all of which are above the fifth tier,—having an aggregate population of 176,819—no scarlet fever was reported during the year.

The sickness-rate in the second tier of counties, as may be seen in Table 2, was 15.19 cases per 10,000 inhabitants. In the city of Detroit, situated in this tier, the rate was 21.31, per 10,000 inhabitants, and in this tier, excluding Detroit, the rate was 8.77, per 10,000 inhabitants.* In the fourth tier of counties, in which is situated the city of Grand Rapids, the sickness-rate was 12.44, per 10,000 inhabitants. In the city of Grand Rapids the rate was 20.67 cases per 10,000 inhabitants, and in the tier of counties excluding Grand Rapids the rate was 10.02 cases per 10,000 inhabitants. In the years, 1894-95, the sickness-rates from scarlet fever in Detroit and Grand Rapids were lower than those for the tiers of counties in which they are situated, and lower than the average for the State. In 1896-97 the reverse of this is shown, the rates in these cities being much higher than in their tiers of counties, and in the State, and this, also, has been the experience of several years previous to 1894.

Death-rates from Reported Scarlet Fever by Divisions and Counties.

Table 2 shows that the greatest death-rate, by tiers of counties, from reported scarlet fever, 1.29 deaths per 10,000 inhabitants, was in the eleventh tier. The second tier of counties, with 1.10 deaths per 10,000 inhabitants, having the next highest death-rate. These tiers, as before stated, having, also, the highest sickness-rates. No deaths were reported from the sixth and seventh tiers. The lowest death-rate from reported scarlet fever, .13 of one death per 10,000 inhabitants, was in the first tier of counties. (This tier also had the lowest death-rate in the year 1896.) The next lowest death-rate, .18 of one death per 10,000 inhabitants, was in the Upper Peninsula.

Table 3 shows that the greatest death-rate, by counties, from reported scarlet fever, 5.28 deaths per 10,000 inhabitants, was in Ogemaw county.

In 33 counties, from which an aggregate of 508 cases of scarlet fever were reported, there were no deaths reported from this disease. In Berrien and Houghton counties the death-rate was the same, .20 of one death per 10,000 inhabitants, this being the lowest death-rate, by counties, from reported scarlet fever during the year. Jackson, with .21 of one death per 10,000 inhabitants, having the next lowest death-rate.

* The Boards of Health of the cities of Detroit and Grand Rapids stated the population of these cities, in 1897, as 275,000 and 90,000, respectively. These numbers were used in making these calculations.

Fatality from Reported Scarlet Fever, by Counties in 1897.

The fatality from scarlet fever in 1897,—i e., the proportion of reported cases which proved fatal, was, for the whole State 4.6 per cent, or about one death to twenty-one cases. In Benzie county only two cases were reported, both of which proved fatal. These occurred in a family in Thompsonville village, who were reported by the local health officer to have recently moved there from Canada, where there had been an epidemic of scarlet fever, and one child in this family had just recovered from the disease. The next highest fatality, 37.5 per cent of reported cases, was in Ogemaw county. (This county, as previously shown, had the highest death-rate.) The minimum fatality, in counties from which deaths were reported, 1.1 per cent of reported cases, occurred in Muskegon county.

TABLE 4.—*Exhibiting the numbers of outbreaks and cases of, and deaths from, scarlet fever which occurred in the cities, villages and townships of Michigan in 1897, and the comparative numbers of outbreaks, cases, deaths, and fatality from this disease in cities, villages and townships. (Compiled from reports of local health officials to the Secretary of the State Board of Health.)*

Classes of Political Divisions.	Popula- tion.*	Health jurisdictions.	Outbreaks in:			Cases.	Deaths.	Fatality. (Per cent deaths of cases.)	Rates per 10,000 Population.	
			Localities.		No. of				Cases.	Deaths.
			No. of	Per cent of all local- ities.						
State (83 counties)-----	2,352,455	1,581	293	19	359	2,482	115	5	10.55	.49
Cities-----	1,194,357	76	50	66	76	1,440	78	5	12.06	.65
Villages-----	249,987	296	51	17	58	243	6	2	9.72	.24
Townships-----	908,111	1,209	192	16	225	799	31	4	8.80	.34

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894.

From the data in Table 4 it may be observed that 66 per cent of the cities, 17 per cent of the villages, and 16 per cent of the townships were infected with scarlet fever. But the average population of the cities is nearly nineteen times the average population of the villages.† The highest case-rate (12.06) and death-rate (.65) occurred in the cities; the lowest case-rate (8.80) occurred in the townships, and the death-rates in the villages and townships were .24 and .34 respectively. The highest fatality (5 per cent) occurred in the cities, and the lowest (2 per cent) occurred in the villages.

† The average population of the cities is 15,215, of the villages, 845, and of the townships, 751.

*Scarlet Fever in Each Month of the Year 1897.*TABLE 5.—*Exhibiting the reported number of outbreaks of Scarlet Fever which Began, the number which Ended, and the number which were Present, in each Month of the Year 1897, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began....	37	24	27	22	23	23	18	17	22	40	30	37	320
Number ended....	41	16	27	23	20	22	23	8	17	28	23	47	295
Number present...	80	61	71	61	62	63	57	50	64	87	86	100	.....

The last line of figures in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Of the 80 outbreaks reported present in January, 43 were outbreaks which began in 1896. In 22 of these outbreaks no new cases occurred in January. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 25 more beginnings than endings of outbreaks reported during the year 1897.

TABLE 6.—*Exhibiting the Number and Per Cent of Localities infected with Scarlet Fever, the Number and Per Cent of Cases of Scarlet Fever Present, and the Number and Per Cent of Cases Taken Sick, in Michigan in each Month, during the Year 1897. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Localities, number.....	79	61	71	61	62	63	57	50	63	86	85	98
Per cent.....	27	21	24	21	21	22	19	17	22	29	29	33
Cases present, number....	316	306	252	218	239	252	208	172	213	339	410	465
Per cent.....	13	12	10	9	10	10	8	7	9	14	17	19
Cases taken sick.....	224	169	154	136	152	163	110	104	126	237	293	295
Per cent.....	9	7	6	5	6	7	4	4	5	10	12	12

The second line of figures, in Table 6, shows the per cent the localities infected in each month are of the exact number of localities (293) reported to this office for the year 1897.

The third line of figures, in Table 6, shows the number of cases reported sick in any part of each month.

As some of the cases were sick longer than one month they are included in the cases sick in more than one month; therefore, the sum of the cases sick in all the months exceeds the total of reported cases (2,482) in 1897; and the sum of the fourth line of figures in Table 6 exceeds 100.

The fourth and last lines of figures, in this table, show the per cent the cases present, and the per cent the cases taken sick, in each month are of the exact number of cases (2,482) reported to this office for the year 1897.

Source of Contagium of Scarlet Fever, How the Disease is Spread, and the Vitality of the Contagium.

Of the 2,482 cases of scarlet fever reported during the year 1897, as exhibited in Table 7, the local health officers reported the source of contagium, as follows: Traced to a former case, 324; probably traced to a former case, 13; attributed to infected houses, articles, clothing, etc., 14; source of contagium unknown, 1,269; source of contagium not stated, 809; traced to an outside jurisdiction, 44; probably from an outside jurisdiction, 9.

TABLE 7.—*Reported Source of Contagium of Cases of Scarlet Fever, in 1897.*

	Cases.
Traced to a former case.....	324
Probably traced to a former case.....	13
Attributed to infected houses, articles, clothing, etc.....	14
Source of contagium unknown, or reports not definite (including "Exposure," "Contagium," "Endemic" and "Sporadic.").....	1,269
Source of contagium not stated.....	809
Traced to outside jurisdictions.....	44
Probably from an outside jurisdiction.....	9
All cases.....	2,482

Cases of Scarlet Fever Traced to a Former Case.

Table 7 shows that of the 2,482 reported cases of scarlet fever in this State in 1897, 324 were reported traced to a former case of the disease. The following extracts are from a few of the health officers' reports in which the cases were traced to a former case in the same jurisdiction:

"The disease in the vast majority of cases was light. People were very careless."—*E. A. Herrig, M. D., Saginaw, W. S., Saginaw county.*

"Case No. 1 ran at liberty and no physician was called until case No. 2 came down, when he found case No. 1 desquamating. It is a wonder that more cases did not develop. No case occurred after quarantine was established. All cases were exposed before a physician was called."—*Peter Stewart, M. D., Elba township, Lapeer county.*

"Children played together and were exposed before they knew it was scarlet fever."—*D. S. Payton, Eveline township, Charlevoix county.*

"Mild cases of scarlatina occurred in family, and they did not employ a physician or know what the trouble was, and were in school while peeling, when discovered."—*Amos S. Young, M. D., Fairfield township, Lenawee county.*

"The first going to school with rash—dismissed the school and burned 25 pounds of sulphur and only had 7 cases."—*G. W. Lowry, M. D., Hastings city, Barry county.*

Source of Scarlet Fever Unknown or Reports Indefinite.

The following extracts are taken from a few of the health officers' reports in which the source of contagium of cases was reported as unknown, or reports were not definite:

"The only exposure, if any, was by a rag peddler."—Wm. H. Sawtell, *Mayfield township, Lapeer county.*

"Local."—John H. Herring, *M. D., Berrien township, Berrien county.*

"Must be sporadic."—H. M. Brodrick, *M. D., Buchanan village, Berrien county.*

"Could not trace source."—J. K. Niven, *M. D., Ironwood city, Gogebic county.*

Duration of the Vitality of the Scarlet Fever Germ.

The germ of scarlet fever is not yet demonstrated; but that there is a germ seems to be proved by the known communicability of the disease.

The following extracts from the reports of health officers and physicians indicate that the scarlet fever germ frequently retains its vitality for a long time outside of the human body, in an apparently dormant or inactive state, in houses, clothing, carpets, furniture, etc., and is then capable of developing scarlet fever in persons coming into such houses or in contact with or near such articles, thus showing the importance of carefully disinfecting all infected houses and articles, even where they are not to be used for a long time:

"Supposed to be from tearing paper off an old house."—F. O. Tefft, *M. D., Tecumseh village, Lenawee county.*

"Playing with rags that came from a house where scarlet fever existed a little over a year ago."—M. Springer, *M. D., South Haven village, Van Buren county.*

"Supposed to have been in some clothing that had been given the children."—G. W. Matteson, *M. D., Middleville village, Barry county.*

"The first case to be reported took the disease from handling the school books of a former patient sick with the disease."—A. D. Hagadorn, *M. D., Lansing city, Ingham county.*

"Carried in clothing."—R. M. Eccles, *M. D., Blissfield village, Lenawee county.*

"Infected house."—Samuel Stevenson, *M. D., Morenci village, Lenawee county.*

Movements of Contagium of Scarlet Fever.

Table (8) and Map, "Movements of Contagium," show the sources and direction of movements of scarlet fever in Michigan, where the contagium was reported by health officers to have been introduced into their jurisdictions from localities outside the State, or from other jurisdictions within the State.

On the Map, the spread of scarlet fever in Michigan as reported to this Office in the year, 1897, is shown by black lines which connect the localities; the arrow-head indicates the direction of the movement in each case.

TABLE 8.—*First, second and third localities, where the second locality was infected with Scarlet Fever from the first, and the third was infected from the second; and the numbers of cases and deaths from Scarlet Fever in the first, second and third localities, with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Berrien county: Benton Harbor city (1896-Jan.)	1	0	Berrien county: Galen township (Jan. 11-Jan. 28.)	1	0			
Berrien county: Lake township (1896-Jan. 26.)	6	0	Berrien county: Weesaw township (Jan. 3-Jan. 30.)	4	0			
Berrien county: Niles city (1896-Jan.)	1	0	Berrien county: Berrien township (Apr. 21-Apr. 27.)	1	0			
Berrien county: St. Joseph city	*	---	Van Buren county: Arlington township (Apr. 20-May 22.)	11	0			
Calhoun county: Eckford township (1896-Feb. 6.)	1	0	Calhoun county: Marengo township (Jan. 26-Mar. 15.)	1	0			
Cass county: Dowagiac city	*	---	Cass county: Cassopolis village (Nov. 23-Dec. 4.)	1	0			
Charlevoix county: Hayes township	*	---	Emmet county: Petoskey city (Feb. 8-May 5.)	26	2			
Cheboygan county: Cheboygan city	32	0	Presque Isle county: Rogers city	2	0			
Cheboygan county: Inverness township	*	---	Cheboygan county: Burt township (Apr.-May.)	5	0			
Clinton county: Westphalia village	*	---	Clinton county: St. Johns village (Aug. 12-Oct. 31.)	6	0			
Eaton county: Charlotte city (May 24-Nov. 23.)	3	0	Jackson county: Springport village (Aug. 12-Sept. 20.)	1	0			
Emmet county: Little Traverse tp.	*	---	Emmet county: Maple River township . (Nov. 26-Dec. 26.)	4	0			
Emmet county: Maple River township . (Feb. 8-Dec. 22.)	39	3	Emmet county: Pleasant View tp. (Feb. 24-Mar. 10.)	1	0			
Gratiot county: Wheeler township	8	0	Gratiot county: Ashley village	1	0			
Ingham county: Alaiedon township	*	---	Ingham county: Meridian township (Oct. 25-May 21, 1898.)	7	1			
Ingham county: Lansing city (Jan. 29-Mar. 5, 1898.)	12	0	Ingham county: Mason city (June 30-Nov. 1.)	19	0			

* Scarlet Fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 8.—CONTINUED.—*Movement of Infection.*

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Ionia county:			Montcalm county:					
Ionia city	6	1	Fairplains township... (Aug. 20-Dec.)	4	0			
Muir village..... (May 14-July 16.)	12	0	Richland township..... (June 7-July 14.)	2	0			
Jackson county:			Hillsdale county:			Hillsdale county:		
Hanover village..... (Sep. 30-Jan. 4.)	14	0	Hillsdale city..... (Oct. 18-Dec. 25.)	10	0	Allen township..... (Oct.-Dec. 1.)	4	0
Jackson county:			Moscow township..... (Oct. 13-Nov.)	2	0			
Jackson city..... (Oct. 6-Dec.)	6	0	Hillsdale county:					
Kalamazoo county:			Wright township..... (Dec. 31-Jan. 20, 1898.)	1	0			
Climax township.....	2	0	Calhoun county:					
Kent county:			Le Roy township.....	1	0			
Alpine township.....	*	—	Ottawa county:					
			Wright township..... (Mar. 7-Apr. 1.)	1	0			
Kent county:			Kent county:					
Grand Rapids city.....	186	6	Byron township..... (July 20-Aug. 1.)	1	0			
			Byron township..... (Sept. 1-Oct.)	1	0			
			East Grand Rapids village (Oct. 29-Dec. 17.)	2	0			
			Paris township..... (Oct. 17-Mar. 19, 1898.)	5	0			
			Montcalm county:					
			Stanton city..... (Nov. 4-Nov. 24.)	2	0			
			Ottawa county:					
			Wright township..... (Jan. 26-July 20.)	12	1			
Kent county:			Ionia county:					
Lowell township.....	*	—	Campbell township... (Nov. 17-Dec.)	4	0			
Lenawee county:			Allegan county:					
Addison village.....	*	—	Allegan village..... (Dec. 2-Dec. 18.)	1	0			
Lenawee county:			Lenawee county:					
Adrian city..... (Jan. 16-Feb. 12.)	2	0	Dover township..... (Feb. 20-Mar. 18.)	6	0			
Lenawee county:			Lenawee county:					
Medina township.....	*	—	Seneca township..... (Oct. 1-Oct.)	1	0			
Livingston county:			Livingston county:					
Conway township.....	*	—	Brighton township... (Jan. 9-Feb. 15.)	3	0			
Livingston county:			Livingston county:					
Hartland township..... (Nov. 15-Dec. 12.)	15	0	Cohoctah township... (Dec. 4-Jan. 14.)	3	0			
			Oceola township..... (Nov. 17-Dec. 17.)	4	0			
Macomb county:			Macomb county:					
Mt. Clemens city..... (Mar. 4-May, 1898.)	62	40	Clinton township... (Sept. 10-Feb. 2, 1898.)	10	2			
			Lenox township..... (Dec. 6-Dec. 30.)	3	0			

* This foot-note is printed at the bottom of the first page of this table.

TABLE 8.—CONTINUED.—*Movement of Infection.*

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Macomb county: Utica village.....	*	---	Monroe county: London township..... (Feb. 12-Apr. 4.)	7	0			
Mason county: Summit township..... (July 25-Jan. 29, 1898.)	3	0	Manistee county: Onkama township... (Oct. 6-Oct. 30.)	1	0			
Mecosta county: Big Rapids city..... (Oct. 19-Nov. 26.)	3	0	Manistee county: Manistee city..... (Mar. 6-Mar. 27.)	1	0			
Oakland county:	---	---	Tuscola county: Millington township (Sept.-Dec.)	4	0			
Oceana county: Benona township.....	*	---	Oceana county: Shelby township..... (Sept. 20-Nov. 15.)	3	0			
Ottawa county: Spring Lake village.... (July 18-Jan. 9, 1898.)	17	0	Ottawa county: Spring Lake township. (Dec. 25-Jan., 1898.)	2	0			
Saginaw county: Saginaw city..... (Jan. 9-Apr., 1898.)	165	2	Tuscola county: Mayville village..... (Mar. 20-Apr. 10.)	1	0			
Shiawassee county: Durand village..... (Apr. 10-Nov. 12.)	9	1	Shiawassee county: Vernon township..... (May 15-May 30.)	2	0			
Shiawassee county: Owosso city..... (June 14-Jan., 1898.)	10	0	Genesee county: Argentine township... (Aug. 15-Aug. 25)	1	0			
St. Clair county: Port Huron city..... (1896-Mar. 21.)	30	4	Sanilac county: Lexington township (Feb. 5-Mar. 2.)	5	0			
St. Clair county: Port Huron city..... (June 23-Oct 14)	5	0	St. Clair county: Grant township..... (Oct. 27-Nov. 28.)	4	0			
Van Buren county: South Haven township (July 13-Sept. 20.)	6	0	Van Buren county: Covert township..... (Nov. 10-Dec. 25.)	3	0			
			Bay county: Bay City..... (July 12-Nov. 16.)	6	0			
			Macomb county: Warren township..... (Sept. 25-Nov. 20.)	6	3			
Wayne county: Detroit city.....	586	54	Shiawassee county: Corunna city..... (Jan. 3-Jan. 17.)	1	0			
			Wayne county: Greenfield township... (Sept. 9-Sept. 24.)	2	0			
			Springwells township. (Aug. 19-Nov. 4.)	2	0			

* This foot-note is printed at the bottom of the first page of this table.

TABLE 8.—CONTINUED.—*Movement of Infection into Michigan from outside the State.*

First Localities from which Scarlet Fever was spread.			Second Localities infected from first.			Third Localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Canada.....			{ Benzie county: Thompsonville village. (Apr. 5-May 5.)	2	2			
			{ St. Clair county: Marine city..... (July 1-July 30.)	1	0			
Chicago.....			Berrien county: Benton Harbor city... (Aug. 23-Dec. 3.)	5	0			
Indiana: Elkhart.....			St. Joseph county: White Pigeon village. (Feb.-Mar. 20.)	3	0	St. Joseph county: Mottville township... (Mar. 20-Apr. 20.)	1	0
Missouri: St. Louis.....			Charlevoix county: Melrose township... (July 11-Sept. 10.)	13	1			
			{ Ingham county: Delhi township..... (Feb. 21-Mar.)	9	0			
Ohio.....			Lenawee county: Seneca township..... (Mar. 20-Apr.)	3	0			
			Newaygo county: Barton township..... (July 29-Aug. 20.)	1	0			

Probable Movement of Infection.

Arenac county: Moffitt township.....	*		Arenac county: Clayton township..... (Nov. 1-Dec. 31.)	28	0			
Clinton county.....			Ingham county: Lansing city..... (June 10-June 17.)	1	0			
Emmet county: Maple River township... (Feb. 8-Dec. 22.)	39	3	Emmet county: Littlefield township... (Apr. 21-May 10.)	1	0			
Jackson county: Hanover village..... (Sept. 30-Jan. 4, 1898.)	14	0	Jackson county: Hanover township..... (Dec. 14-Jan. 22.)	18	1			
Kalamazoo county: Kalamazoo city.....	5	0	Kalamazoo county: Climax township.....	2	0			
Kent county: Grand Rapids city..... (Jan. 1-Jan. 12, 1896.)	186	6	Washtenaw county: Ypsilanti city..... (Aug. 25-Sept. 11.)	1	0			
Mason county: Ludington city..... (Apr. 14-.)	12	0	Mason county: Summit township..... (Dec. 1-Jan. 29, 1898.)	9	0			
Menominee county: Nadeau township.....	*		Menominee county: Mellen township..... (June 1-June 21.)	1	0			

* This foot-note is printed at the bottom of the first page of this table.

TABLE 8.—CONCLUDED.—**Probable Movement of Infection.**

First Localities from which Scarlet Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Wayne county: Detroit city..... (Jan. 1-Dec. 31.)	586	54	Livingston county: Hartland township.... (Nov. 15-Dec. 12.)	15	0			
			Monroe county: Monroe city..... (Aug. 7-Oct. 27.)	3	0			
Wayne county: Nankin township.....	*	---	Wayne county: Livonia township..... (Feb. 6-Mar. 20.)	7	0			

* This foot-note is printed at the bottom of the first page of this table.

MOVEMENTS OF CONTAGIUM OF SCARLET FEVER IN 1897.



THIS MAP ILLUSTRATES TABLE 9. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS. ——— DEFINITELY TRACED. - - - - - PROBABLY TRACED.

NEGLECT OF MEASURES TO RESTRICT SCARLET FEVER, VIOLATION OF PUBLIC HEALTH LAWS, ETC.

The reports of health officers state that the disease is spread by the first case or cases being of a mild form of the disease and in consequence often no physician is called and the case not reported or restricted in any way.

Outbreak of Scarlet Fever in Maple River Township, Emmet County.

April 24, 1897, H. W. Morford, health officer of Maple River township, wrote the following letter to the Secretary of this Board. Mr. Morford's letter is a fair sample of many received at this office from local health officers:

"This disease has been spread by children who had it in a mild form and were not attended by any physician, and were not reported to the health officer and were sent to school and exposed the whole school. It is generally in a mild form. It will probably have a run through the village and township, for at present it is impossible to tell who and how many are exposed. We are, with the help of the physicians in charge, doing all we can to control it and stop its spreading."

This neglect of mild cases resulted in 39 cases and three deaths. This outbreak in Maple River was given as the source of contagium of an outbreak in Pleasant View township, and as the probable source of an outbreak in Littlefield township, Emmet county.

Report of an Investigation of Scarlet Fever at Hartland Township, Livingston County.

An outbreak report, dated Nov. 29, 1897, of a case of scarlet fever in Hartland township, was received at this office from Dr. J. J. Boyd, the health officer of that township.

A petition, dated Nov. 30, 1897, signed by ten residents of the township of Hartland was sent to this office asking that some one be sent to diagnose suspected cases of scarlet fever in Hartland township.

Secretary Baker wrote to Dr. Boyd, December 2, 1897, as follows:

"Your letter of Nov. 29, with outbreak report of the case of Miss E. W—, is before me, for which please accept thanks. Please make reports to this office at the end of each week so long as the disease lasts. I have no doubt that the disease is scarlet fever: and, if there is any question, the public should be given the benefit of the doubt. I hope it will not be necessary to send a representative of this Board to Hartland township. When cases of dangerous communicable diseases are reported to you as such, you should not question the diagnosis, but take active measures to restrict the disease in accordance with the law. I send you herewith a copy of the pamphlet, Work of Health Officers, in which I have marked parts bearing upon your duties. I hope you will inform yourself of just what is required of you.

"The law makes it *your duty** to placard the house, and disinfect after the case has recovered. I understand that other cases (W. G. Wallace's wife) of scarlet fever exist in the township. Please investigate and report to this office at once.

"If this office can be of further service to you, it will give me pleasure."

Upon receipt at this Office of later requests for some one to diagnose this disease, which continued to spread, Dr. George E. Ranney, Ex-President of the State Medical Society, State Inspector for the State Board of Health, was sent by the State Board to investigate this outbreak.

The following is Dr. Ranney's report of this investigation:

* Not the duty of the clerk.

"Pursuant to authority by you I investigated the facts relative to the outbreak of scarlet fever in the village of Hartland, Mich., and beg to submit the following report:—
 "On the eighth inst. I went to Brighton and consulted Dr. McHench, of that place, who had been called to see one of the cases in question; and who first diagnosed some of the cases in question as scarlet fever, and he gave me the history of the cases he saw and a history of the outbreak of the fever and its spread, as far as he could from what he had seen and heard concerning it.

"With the data furnished from your office and the verbal report of Dr. McHench, I visited Hartland on the 9th inst., and ascertained the facts to be about as follows:—

"First calling at the residence of Mr. L—, I saw Miss W—, aged about 24 years, who informed me that she was taken ill Nov. 14, with high fever and sore throat; that on the following day an eruption occurred on her body, that the fever was as high as 104° F., and that for some time she was delirious, and that a general desquamation of the epidermis had followed. I found her able to do the housework, though with irritable throat, and appearing weak, like one recovering from a severe illness. The desquamation in her case was not complete and the epidermis was scaling off her hands, legs and feet.

"Nov. 21, Mrs. L— was taken ill and had some fever, sore throat and slight eruption. I found her looking somewhat ill but able to be about her house. Her throat was sore and the skin was peeling off her hands and ankles.

"I next visited the store of Mr. W—, and saw his son, about 13 years old, who was taken sick about six weeks ago, I think, with fever, sore throat, accompanied with a rash on his body. He was looking pale and his throat was a little sore, and his hands and legs were desquamating when I saw him. I visited Mrs. W— and found her looking poorly, with irritable throat. She had been ill about three weeks, but claimed that it was caused by an injury to her side from a fall, that the sore throat was a common thing with her. She did not know whether or not she had scarlet fever when a child. Her hands were desquamating, but she claimed that was also a common thing in her case. This latter patient I visited in company with Dr. J. J. Boyd, of Hartland, who had treated her and her son. I also visited, with him, the residence of the Rev. M—, and found five of his children, ranging from two to ten years of age, all sick with the disease, two of whom had a very high fever and with a profuse scarlet rash on their bodies. A young woman, a domestic in the house of Rev. M—, was convalescing from what had been treated as a lung and pleuritic difficulty. She still looked ill and was unable to work. Her throat was sore and her hands and legs were desquamating. Rev. M— came home from Flint about three weeks ago, sick, and when I saw him was far from well, and, I think, is confined to his house. Mrs. M— was not well but was able to do housework. Miss W—, Mrs. L—, Mrs. W—, the young lady at Rev. M—'s, Rev. and Mrs. M—, did not know as they had ever had scarlet fever in childhood.

"About six weeks ago, Willie McC—, a lad about seven years of age, the grandson of Widow McC—, living in the outskirts of the village, had a fever, sore throat, and rash on his body. Mrs. McC— said that she thought it was "nothing but scarlet rash," and that she called no doctor, but treated the child herself. He was convalescent and attending school. His throat was sore and his hands and legs were desquamating when I saw him.

"Mrs. McC— reported that a little girl, three years old, belonging to Mrs. B—, in Hartland, had an eruptive disease, about one week before her grandchild was taken ill, but did not know as her grandchild had been where she could have taken the disease from the B— child.

"About two months ago or more a Mrs. R— came from Detroit, with two or three of her children, who had just had or were then recovering from scarlet fever, and went to her brother's living about three miles south and one mile west of Hartland, and that Mrs. R—'s brother, T— G—, took the disease and that his brother E— G—, living two miles west of his place, took the disease. I was informed that they were treated by a Howell physician. The Mrs. R— and her children attended a public church social some eight weeks ago, near Hartland, and though some people from near Hartland attended the 'social' it is not reported that any one of them took the disease.

"Dr. J. J. Boyd and Mr. Wallace, members of the board of health of Hartland township, promised to quarantine the premises of Mr. L. W—, Mrs. McC— and Rev. M—, to placard the premises, and at the proper time thoroughly disinfect the houses, and, in the meantime, quarantine the persons above referred to as being ill or convalescent.

"I visited the school and asked the co-operation of the Supt. to encourage every means to prevent the spread of the disease. Mr. Lemen, one of the school directors, Dr. Boyd and Mr. Wallace, promised that the school should be closed at once.

"I forgot to state that one of the M— children convalescent from the disease, attended Sunday school last Sunday.

"The cases occurring in Hartland were all treated, I believe, by Dr. Boyd, except Mrs. L—, the McC— boy, and, possibly, Mrs. B—'s three year old child.

"Some unpleasant feeling had grown out of a difference in diagnosis of the disease and the matter of quarantining and placarding the houses, and I used my best efforts to restore harmony among them, to convince them of the importance of treating every suspicious case as one of scarlet fever, and to do everything possible to prevent the spread of the disease. I was treated by all with the greatest consideration and with apparent satisfaction and welcome.

"Note:—I believe that all the cases I saw, above referred to, were scarlet fever, with the possible exceptions of Mrs. W— and Rev. M—.

"At the time of my visit Mr. L—'s premises were the only premises placarded and his family the only ones quarantined."

December 13, 1897, Secretary Baker wrote as follows to Dr. Boyd:

"Your letters of December 9 relative to scarlet fever are before me, for which please accept thanks. In your weekly report you report only three cases, two cases as having been

taken sick during the week ending December 11, and yet you have treated five children in the family of Rev. McI— who are now or have been sick with scarlet fever. The Inspector sent out from this Board to investigate this subject reports that several other cases have occurred in Hartland which were unquestionably scarlet fever and yet you do not report them, neither have you taken any measures to prevent the disease from spreading. This is a subject which you cannot afford to treat lightly, as the law is very severe in its penalty upon those who knowingly and wilfully expose or aid in exposing others to certain dangerous communicable diseases, among which is scarlet fever. You promised our Inspector that you would report fully to this office and that you would also take prompt measures to prevent the disease from spreading, but, I am informed that you did not, and it does not look as though you were doing this, when you only report two cases out of five in one family as having scarlet fever. I trust that you will at once proceed to do all in your power to prevent any further spread of the disease, and that it will not be necessary for this Board to establish a quarantine around Hartland."

December 13, 1897, Secretary Baker also wrote to G. W. Wallace, clerk of the board of health of Hartland, as follows:

"Our official inspector, Dr. Ranney, has reported relative to the numerous cases of scarlet fever in Hartland, that the disease had not been restricted as the law requires, but that you and the health officer, Doctor Boyd, promised to take immediate action required by law. I am now informed that neither you nor Doctor Boyd has taken such action, and that the danger of the disease spreading to other townships still exists. It is reported to have spread to Cohoctah, and the disease is also reported in Oceola township. But two courses seem open to this office: one the immediate prosecution of the offending officers of the local board of health; the other—placing quarantine guards around the village to stop communication with the outside world. From what I can learn, the greatest danger to persons coming to Hartland, is, perhaps, in your own store. I hope to be informed soon that thorough disinfection of your clothing, and of all of the other articles liable to be infected, has been done, that your son, who is still in a dangerous condition for spreading the disease to other people, be kept away from the store and from any person who visits the store, and that as soon as he is through desquamating, that your residence be thoroughly disinfected.

"If what is mentioned above is done, and the health officer does his full duty (promptly) it may not be necessary to surround Hartland with guards. This last is an expensive procedure which this office is anxious to avoid. Can you not induce the health officer to promptly comply with Act 137, laws of 1883, a marked copy of which I send you herewith? "I shall be glad to hear from you as soon as possible."

Dr. Boyd replied to this letter that he was doing all in his power to control the disease.

The president of the local board of health, Arthur W. Cimmer, in a letter to this office, dated December 16, stated that he believed that all cases were under proper restriction, that there had been no new cases for a week and that the health officer was doing and would do all he could to stamp out the disease.

No further official reports of this outbreak were received at this office.

OUTBREAKS OF SCARLET FEVER IN WHICH ISOLATION AND DISINFECTION WERE ENFORCED.

The following is the substance of a few health officers' statements which are representative of the statements of those health officers whose reports indicated that they had quite carefully enforced isolation and disinfection.

Concerning restrictive measures used in a case of scarlet fever in Ada township, Kent county, the health officer, Dr. F. J. Lee, reported:

"Patient confined to a single room and isolated from all except the nurse and physician, and the family quarantined. The discharges of the patient were disinfected by carbolic acid and buried. After recovery of the patient, all the rooms of the house were disinfected by fumes of burning sulphur at the rate of three pounds per 1,000 cubic feet of air space. All infected articles, clothing, bedding, etc., were exposed to sulphur fumes, and boiled where possible."

Dr. Geo. G. Barnett, health officer of the city of Ishpeming, Marquette county, reported that he was successful in restricting an outbreak in his jurisdiction to two cases although there were several other children in the family. He restricted as follows:

"Patients were confined to one room with the mother. The discharges of patients were disinfected with boiling water or chloride of lime and either burned or buried. Five pounds of chloride of lime were used in the privy vault. All infected clothing, bedding, etc., were boiled or fumigated or burned, and after recovery of the patients all the rooms were disinfected by fumes of burning sulphur at the rate of about five pounds per 1,000 cubic feet of air space."

In regard to restrictive measures used in an outbreak of scarlet fever in Buchanan village, Berrien county, the health officer, Dr. H. M. Brod-
rick, reported in substance as follows:

"Child kept in two rooms and isolated from all except the nurse and physician, and house quarantined. Discharges of the patient were burned or placed in the privy vault, which was disinfected by chloride of lime and fumes of burning sulphur. All infected clothing, bedding, etc., were disinfected by boiling and by fumigation. After recovery of patient, all the rooms were disinfected by fumes of burning sulphur at the rate of three pounds per 1,000 cubic feet of air space."

ESTIMATED NUMBER OF CASES OF SCARLET FEVER PREVENTED, AND NUMBER OF LIVES SAVED BY ISOLATION AND DISINFECTION.

Tables 9 and 10 and the following diagram compare the average numbers of cases and deaths in outbreaks of scarlet fever where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where those measures were neglected.* By Table 10 it may be seen that during the eleven years, 1887-97, there were over five times as many cases and deaths in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 9 it may be seen that during the year 1897 there were reported to the office of the State Board of Health 336 outbreaks of scarlet fever, with 1,531 cases and 52 deaths.† Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 2,278 cases and 91 deaths, and

* In the compilation of the reports for Tables 9 and 10 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

† *Definition of Outbreak*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of *years* require that outbreaks be counted as closed, at the end of the year; while in comparing *outbreaks* for testing the value of isolation and disinfection, it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

TABLE 9.—Scarlet Fever in Michigan in 1897: Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 336 outbreaks reported; (2) in the 150 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 5 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 36 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 16 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 27 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 63 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 59 outbreaks in which Isolation and Disinfection were both enforced.

	(1) All outbreaks. (336 outbreaks.)*		(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (130 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (5 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (36 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (16 outbreaks.)		(6) Isolation enforced—Disinfection neglected. (27 outbreaks.)		(7) Isolation and Disinfection both neglected. (63 outbreaks.)		(8) Isolation and Disinfection both enforced. (59 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals....	1,531	52	654	21	20	0	88	2	148	7	67	0	427	17	127	5
Averages	4.56	.15	5.03	.16	4.00	0	2.44	.06	9.25	.44	2.48	0	6.78	.27	2.15	.08

* These do not include the cases and deaths in Detroit, Grand Rapids, and Saginaw, because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease was present in some part of the city nearly all the time.

† These figures are graphically represented in the diagram opposite this page, entitled "Isolation and Disinfection restricted Scarlet Fever in Michigan in 1897."

taking from these respectively the cases (1,531) and deaths (52) which did occur, leaves 747 cases and 39 deaths indicated as prevented in these 336 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 5,366 outbreaks which occurred during the eleven years, 1887-97, is 31,228 cases and 1,012 lives. This is shown in Table 10.

Table 9 and accompanying diagram show that for the year 1897 the number of cases per outbreak in which isolation and disinfection were both neglected was 6.78. For the year 1896 the average was 8.51, for the year 1895, 13.88, for the year 1894, 13.00, and for the year 1893, 12.19.

ISOLATION AND DISINFECTION RESTRICT SCARLET FEVER.

Scarlet Fever in Michigan in 1897:—Exhibiting the average numbers of cases and deaths per outbreak:—in all outbreaks in which Isolation and Disinfection were both Neglected: and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health from reports made by local Health Officers.)

Scale for cases and deaths.	Isolation and Disinfection Neglected.		Isolation and Disinfection Enforced.	
	Cases.	Deaths.	Cases.	Deaths.
6	6.78			
5				
4				
3				
2			2.15	
1		.27		.08

This diagram graphically represents the lower line of figures in the last four columns of Table 9.

[PLATE 991.]

TABLE 10.—SCARLET FEVER.—*Exhibiting for the eleven years, and for each of the eleven years 1887-97, the numbers of Reported Outbreaks, Cases and Deaths; also for this eleven-year period the average numbers of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection or both were Doubtful; Isolation and Disinfection both Neglected, Isolation and Disinfection both Enforced; and, also, the numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

Years.	* All Outbreaks.			Isolation or Disinfection, or both, not Mentioned, or Statements Doubtful.			Isolation and Disinfection both Neglected.			Isolation and Disinfection both Enforced.			Cases and Deaths Indicated as having been Prevented by Isolation and Disinfection.		
	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Outbreaks.	Cases.	Deaths.	Cases.	Deaths.	
1887	299	1,882	111	190	1,200	93	32	440	34	64	148	11	2,229	176	
1888	340	1,838	112	225	955	74	61	724	33	36	80	3	2,108	72	
1889	417	2,822	123	284	1,453	61	72	1,208	48	52	140	10	4,175	156	
1890	477	3,054	115	302	1,711	67	94	1,137	36	42	76	1	2,718	66	
1891	602	4,935	193	380	3,012	91	141	1,704	66	42	107	1	2,342	90	
1892	622	5,210	306	377	2,914	188	110	1,621	59	42	97	7	3,428	30	
1893	607	5,219	327	387	3,197	201	124	1,511	99	60	157	8	2,912	207	
1894	662	4,319	175	378	2,366	93	104	1,348	42	74	187	9	4,231	90	
1895	555	2,905	85	275	1,259	42	82	1,138	27	92	162	4	4,798	98	
1896	389	1,534	42	148	485	15	80	681	16	78	153	4	1,776	36	
1897	336	1,531	52	130	654	21	63	427	17	59	127	5	717	39	
Totals	5,366	35,310	1,671	3,076	19,236	949	963	11,939	477	641	1,431	63	32,054 31,328	1,060 1,012	
Averages, eleven years	488	3,210	152	280	1,749	86	88	1,085	43	58	130	6	2,914	96	
Average cases and deaths per outbreak for eleven years, 1887-97.	-----	6.58	.31	-----	6.25	.31	-----	12.40	.50	-----	2.21	.10	-----	-----	

* Outbreaks in Detroit, Grand Rapids and a few other localities, where the disease was present throughout the whole year, are not included, owing to the difficulty in determining the beginning and ending of an outbreak in those localities. The localities which are thus excluded in 1897, are given in a foot-note to Table 10 of this article; and for previous years, in foot-notes to similar tables in articles on scarlet fever for those years.

† The numbers of cases and deaths in this double column are found by multiplying "all outbreaks" for each year by the average numbers of cases or deaths per outbreak, as the case may be, which were reported to have occurred that year. ‡ The two sets of numbers appearing in this column are based on two distinct methods of solution which are explained as follows:—(1) The 32,054 cases and 1,060 deaths are totals of the columns representing cases and deaths saved as explained in the † foot-note; (2) the 31,328 cases and 1,012 deaths are obtained by multiplying the average numbers of cases and deaths per outbreak for the eleven years, 1887-97 (12.40 and .50, where isolation and disinfection were neglected) by the total number of outbreaks, to find the numbers which would have occurred if all outbreaks had been neglected, and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the eleven-year period.

*Period of Incubation, in Scarlet Fever.*TABLE 11.—*Exhibiting the reported Period of Incubation, stated in days, in 103 instances of Scarlet Fever—Compiled from reports of Health Officers in Michigan, for the year 1897.*

Incubation period—days.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	21	22
Instances in each period.....	1	7	*5	+15	+9	\$4	¶20	||6	**3	++13	1	0	2	++8	1	1	§§2	1	3	1

* In 1 of these instances it was reported as about 3 days.

† In 1 of these instances it was reported as about 4 days.

‡ In 3 of these instances it was reported as about 5 days.

§ In 2 of these instances it was reported as about 6 days.

|| In 4 of these instances it was reported as about 7 days.

¶ In 2 of these instances it was reported as about 8 days.

** In 1 of these instances it was reported as about 9 days.

++ In 7 of these instances it was reported as about 10 days.

++ In 3 of these instances it was reported as about 14 days.

§§ In one of these instances it was reported as about 18 days.

The average period of incubation in the 103 reported instances is 8 days; the greatest number of instances given in any single period was in the 7-day period.

TABLE 12.—*Exhibiting, relative to 57 instances of Scarlet Fever in Michigan in 1897, the reported Period of Incubation, within certain limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.
1 to 2	1.5	5 to 6	5.5	7 to 9	8.	7 to 12	9.5	7 to 12	9.5
1 to 2	1.5	5 to 9	7.	7 to 9	8.	7 to 12	9.5	7 to 21	14.
1 to 2	1.5	5 to 14	9.5	7 to 9	8.	7 to 12	9.5	7 to 21	14.
1 to 2	1.5	5 to 28	16.5	7 to 9	8.	7 to 12	9.5	8 to 10	9.
1 to 14	7.5	6 to 7	6.5	7 to 9	8.	7 to 12	9.5	8 to 10	9.
1 to 17	9.	6 to 8	7.	7 to 9	8.	7 to 12	9.5	10 to 12	11.
3 to 5	4.	6 to 10	8.	7 to 9	8.	7 to 12	9.5	10 to 12	11.
3 to 7	5.	6 to 21	13.5	7 to 9	8.	7 to 12	9.5	10 to 14	12.
3 to 10	6.5	7 to 9	8.	7 to 9	8.	7 to 12	9.5		
4 to 5	4.5	7 to 9	8.	7 to 12	9.5	7 to 12	9.5		
4 to 14	9.	7 to 9	8.	7 to 12	9.5	7 to 12	9.5		
		7 to 9	8.	7 to 12	9.5	7 to 12	9.5		

The average of all the means, for the 57 instances, is 8 days.

AGES OF GREATEST PREVALENCE OF, AND MORTALITY FROM, SCARLET FEVER.

In Table 13 are shown the numbers of cases of, and deaths from, scarlet fever in Michigan in 1897, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in special groups were of all deaths.

Of the total numbers of cases and deaths reported to this office for the year 1897, the number of deaths per 100 cases was 4.6; and in the smaller numbers of cases and deaths concerning which the ages were stated, the number of deaths per 100 cases was 5.3; of the 2,482 cases of scarlet fever reported, the ages were stated of 1,760, which was 70.9 per cent of the

cases; and of the 115 deaths reported, the ages were stated of 94, which was 81.7 per cent of the decedents.

By this table (13) it may be seen that the greatest number of cases of scarlet fever occurred in children under 10 years of age,—71.4 per cent of all cases, relative to which the age was stated, having occurred in that period of age; 24.1 per cent of all cases occurred in the next two age-periods, 10 to 20 years.

The greatest number of deaths occurred in the first five-year period,—48.9 per cent of all deaths having occurred in that age-period. The next greatest number of deaths, 33.0 per cent of all deaths, occurred in the second five-year period, 5 to 10 years.

The fourth line of this table (13) shows that the greatest fatality from this disease was in children under five years of age. By single years the fatality was greatest in children under one year of age.

From Table 14 it may be seen that about ninety per cent of the cases and about ninety-five per cent of all the deaths, in which the ages were stated, occurred in persons under fifteen years of age. In the years, 1892-97, and in each of these years, the proportions were about the same.

TABLE 13.—*Exhibiting in certain Age-Groups, the numbers of Cases and Deaths from Scarlet Fever; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of All Deaths; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1897 which stated the ages.*

	Number and per cent of Cases and Deaths in certain Age-groups.																			
Ages in groups of years-----	All ages known.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5 years.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	Over 60.	
No. of cases-----	*1,760	23	49	111	136	157	476	780	331	94	32	22	6	16	2	1	0	0	0	
Per cent the cases in each group were of all cases.	100	1.3	2.8	6.3	7.7	8.9	27.0	44.3	18.8	5.3	1.8	1.3	.3	.9	.1	.1	0	0	0	
No. of deaths-----	94	4	6	12	10	14	46	31	12	3	2	0	0	0	0	0	0	0	0	
Per cent the deaths in each group were of cases in that group-----	5.3	17.4	12.2	10.8	7.4	8.9	9.7	4.0	3.6	3.2	6.3	0	0	0	0	0	0	0	0	
Per cent the deaths in each group were of all deaths	100	4.3	6.4	12.8	10.6	14.9	48.9	33.0	12.8	3.2	2.1	0	0	0	0	0	0	0	0	
Per cent the deaths in special groups were of all deaths-----		48.9					82.0		18.1			0								

* Does not include those cases or deaths where the age was not stated.

TABLE 14.—*Exhibiting, in certain Age-Groups, the per cent of Cases of, and Deaths from, Scarlet Fever in the six years and in each of the years 1892-97; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths.—Compiled from all reports for the years 1892-97, which stated the ages.*

Year.		Total No. included. *	Per cent of Cases and Deaths in certain Age-Groups.										
			All Ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.
1892.	Cases.....	2,832	100	30.0	41.1	18.4	5.9	2.1	.9	1.0	.4	.1	.1
	Deaths.....	128	100	48.4	35.9	10.9	1.6	.8	0	1.6	0	.8	0
1893.	Cases.....	2,666	100	38.7	36.6	15.0	5.1	2.0	1.1	.8	.4	.3	.1
	Deaths.....	166	100	56.0	27.1	12.0	1.8	1.8	.6	0	0	.6	0
1894.	Cases.....	2,595	100	36.4	38.5	15.0	5.4	1.8	1.6	.6	.4	.2	.2
	Deaths.....	91	100	71.4	16.5	5.5	4.4	1.1	1.1	0	0	0	0
1895.	Cases.....	2,359	100	36.6	38.2	14.7	5.3	2.1	1.3	1.0	.5	.04	.3
	Deaths.....	83	100	60.2	19.3	10.9	7.2	2.4	0	0	0	0	0
1896.	Cases.....	1,891	100	28.7	44.6	17.6	5.0	1.9	1.2	.6	.3	.1	.05
	Deaths.....	43	100	60.5	34.9	4.7	0	0	0	0	0	0	0
1897.	Cases.....	1,760	100	27.0	44.3	18.8	5.3	1.8	1.3	.3	.9	.1	.1
	Deaths.....	94	100	48.9	33.0	12.8	3.2	2.1	0	0	0	0	0
1892-97.	Cases.....	14,103	100	33.4	40.2	16.4	5.3	2.0	1.2	.7	.5	.3	.1
	Deaths.....	605	100	56.5	27.8	10.2	3.0	1.5	.3	.3	0	.3	0

* In this column cases include both fatal and non-fatal cases.

TABLE 15.—*Exhibiting, by Sex, for each year of Age, and in certain Age-Groups, the number of persons who died from Scarlet Fever during the year 1897, and the per cent the deaths in each Age-Group were of deaths at all ages. (Compiled from such reports to the State Board of Health as stated the sex and age.)*

Sex.		Number and per cent of Deaths by Sex, in certain Age-Periods.																				
	Ages in Years and groups of Years.	All ages.	Under 5.				5-9.				10-14.				15 years and over.							
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	20	21
Males.	No.of Deaths by single Years -----		2	4	6	5	8	4	6	5	2	1	3	1	0	0	0	1	0	0	0	0
	No. of Deaths by Groups of Years -----	48	25				18				4				1							
	Per cent the deaths in each age-group were of the total deaths* among Males.....		52.1				37.5				8.3				2.1							
	Average age at death, from Scarlet Fever.....	4.9																				
Females.	No.of deaths, by single Years -----		2	2	6	5	6	4	3	1	3	2	3	1	2	2	0	0	1	1	1	1
	No. of Deaths, by Groups of Years -----	46	21				13				8				4							
	Per cent the deaths in each age-group were of the total deaths* among Females.....		45.7				28.3				17.4				8.7							
	Average age at death, from Scarlet Fever.....	6.6																				
Both sexes.	No.of deaths, by single Years -----		4	6	12	10	14	8	9	6	5	3	6	2	2	2	0	1	1	1	1	1
	No. of Deaths, by groups of Years.....	94	46				31				12				5							
	Per cent the deaths in each age-group were of the total deaths* of both sexes.....		48.9				33.0				12.8				5.3							
	Average age at Death, from Scarlet Fever.....	5.7																				

* Deaths from Scarlet Fever.

From Table 15 it may be seen that the ages of 48 males and 46 females, who died from scarlet fever in 1897, were given.

The average age of males who died from scarlet fever in 1897, and whose ages were reported, was 4.9 years, of females, 6.6 years, and of both sexes, 5.7 years.

TABLE 16.—*Exhibiting by Sex, and in certain Age-Groups, the per cent of persons who died from Scarlet Fever in Michigan, during the five years and each of the five years, 1893-97; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from Scarlet Fever.															
Year.	Sex.	Average age, Years.	No. of Deaths included.	Ages.—In Periods of Years. Per Cent of Deaths in each Period of Age.											
				All ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1893.	Males.....	5.4	73	100	64.4	24.7	8.2	0	1.4	1.4	0	0	0	0	0
	Females.....	7.1	93	100	49.5	29.0	15.1	3.2	2.2	0	0	0	1.1	0	0
1894.	Males.....	5.0	42	100	71.4	19.0	4.8	2.4	0	2.4	0	0	0	0	0
	Females.....	5.6	49	100	71.4	14.3	6.1	6.1	2.0	0	0	0	0	0	0
1895.	Males.....	6.2	39	100	64.1	23.1	2.6	7.7	2.6	0	0	0	0	0	0
	Females.....	6.8	44	100	56.8	15.9	18.2	6.8	2.3	0	0	0	0	0	0
1896.	Males.....	5.0	26	100	50.0	42.3	7.7	0	0	0	0	0	0	0	0
	Females.....	3.2	17	100	76.5	23.5	0	0	0	0	0	0	0	0	0
1897.	Males.....	4.9	48	100	52.1	37.5	8.3	2.1	0	0	0	0	0	0	0
	Females.....	6.6	46	100	45.7	28.3	17.4	4.3	4.3	0	0	0	0	0	0
1893-97.	Males.....	5.3	228	100	61.4	28.1	6.6	2.2	.9	.9	0	0	0	0	0
	Females.....	6.4	249	100	56.2	23.3	13.3	4.4	2.4	0	0	0	.4	0	0

Table 16 shows that for the five years, and each of the five years, 1893-97, the greatest per cent of both males and females who died from scarlet fever, and whose ages were reported, were under ten years of age.

TABLE 17.—*Exhibiting, by Sex, the per cent of persons in certain Age-Groups who recovered from Scarlet Fever, in Michigan, during the five years, and each of the five years, 1893-97; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of non-fatal cases Years.	No. of cases included.	Age.—In Periods of Years. Per cent of (non-fatal) Cases in each Period of age.											
				All Ages.	Under 5 years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1893.	Males.....	7.9	1,133	100	41.3	36.4	14.1	3.6	2.2	1.1	.5	.5	.9	.2	0
	Females..	8.7	1,367	100	33.7	38.1	16.0	6.7	1.8	1.2	1.0	.4	.4	0	.07
1894.	Males.....	8.2	1,122	100	37.7	38.6	13.6	5.8	1.8	1.3	.4	.3	.4	.1	.1
	Females..	8.8	1,382	100	33.0	39.9	16.9	5.1	1.9	1.9	.7	.5	.1	0	.1
1895.	Males.....	7.8	1,057	100	39.5	38.9	13.5	4.0	1.8	1.0	.7	.5	0	0	.1
	Females..	9.1	1,219	100	32.5	39.0	15.9	6.2	2.3	1.5	1.4	.6	.1	.3	.2
1896.	Males.....	7.0	827	100	31.8	45.8	16.2	4.1	1.3	.6	.1	0	0	0	0
	Females..	8.5	1,021	100	24.9	44.1	19.1	5.9	2.4	1.8	1.1	.6	.2	.1	0
1897.	Males.....	8.3	751	100	27.6	44.6	19.3	4.7	1.5	1.1	.1	1.1	.1	0	0
	Females..	8.4	915	100	24.4	45.2	19.0	6.1	2.1	1.5	.5	.9	.1	.1	0
1893-97.	Males.....	7.8	4,890	100	36.4	40.3	15.0	4.4	1.8	1.0	.4	.4	.1	.1	.04
	Females..	8.8	5,904	100	30.5	40.8	17.2	6.0	2.1	1.6	1.0	.5	.2	.1	.1

AVERAGE DURATION OF SCARLET FEVER, FATAL AND NON-FATAL CASES.

TABLE 18.—*Exhibiting, by sex of patient, by per cent of cases which died in specified periods of time, the duration (in days) of fatal cases of sickness from Scarlet Fever, in Michigan, during the years 1893-97. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal Cases of Scarlet Fever.														
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per cent of Deaths in each Period of Days.											
			All Periods.	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 days and over.
1893.	Males.....	60	100	38.3	28.3	8.3	8.3	10.0	1.7	1.7	0	0	0	3.3
	Females.....	82	100	41.5	22.0	14.6	9.8	6.1	1.2	1.2	0	0	2.4	1.2
1894.	Males.....	37	100	35.1	24.3	18.9	2.7	2.7	2.7	1.7	0	5.4	0	5.4
	Females.....	42	100	40.5	26.2	19.0	2.4	7.1	2.4	0	0	2.4	0	0
1895.	Males.....	25	100	44.0	20.0	12.0	8.0	4.0	8.0	0	4.0	0	0	0
	Females.....	35	100	40.0	28.6	11.4	2.9	2.9	5.7	2.9	2.9	2.9	0	0
1896.	Males.....	11	100	18.2	27.3	18.2	9.1	9.1	0	9.1	9.1	0	0	0
	Females.....	11	100	54.6	18.2	9.1	0	9.1	0	9.1	0	0	0	0
1897.	Males.....	22	100	45.5	22.7	13.6	0	13.6	0	0	4.5	0	0	0
	Females.....	16	100	62.5	6.3	12.5	12.5	6.3	0	0	0	0	0	0
1893-97.	Males.....	155	100	38.1	25.2	12.9	5.8	7.7	2.6	1.9	1.9	1.3	0	2.6
	Females.....	186	100	43.5	22.6	14.5	6.5	5.9	2.2	1.6	.5	2.2	0	.5

From Table 18 it may be seen that of the fatal cases of scarlet fever, in the five years, and each of the five years, 1893-97, of which the interval between the day of being taken sick and the day of death was reported, the largest per cent, with the exception of males in 1896, died before the sixth day of sickness.

The average duration of sickness in fatal cases of scarlet fever in 1897 was 9.6 days for males, and 7.6 days for females.

From Table 19 it may be seen that of the non-fatal cases of scarlet fever in the five years and each of the five years, 1893-97, of which the interval between the day of being taken sick and the day of recovery was reported, the greatest per cent were sick from six to twenty-six days, and that the duration in each five-day period, for the five years, was nearly the same for both sexes.

The average duration of sickness for non-fatal cases of scarlet fever in 1897 was 17.4 days for males and 17.7 days for females.

The average duration of sickness in fatal cases of scarlet fever in the years, 1893-97, was 11.8 days for males, and 10 days for females. The average duration of sickness in non-fatal cases of scarlet fever in this period of years was 18.7 days for both males and females.

TABLE 19.—*Exhibiting by Sex of patient, by per cent of cases which recovered in specified periods of time, the Duration (in days) of Non-Fatal cases of sickness from Scarlet Fever, in Michigan, during the years 1893-97. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Scarlet Fever.													
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Non-Fatal Cases in each Period of Days.										
			All Periods.	0 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50. Over 50 days.
1893.	Males.....	687	100	4.8	26.3	23.0	14.0	11.6	9.0	3.8	3.5	1.6	1.3
	Females..	809	100	4.1	24.7	24.8	16.1	10.1	11.5	3.7	1.7	2.0	.2
1894.	Males.....	761	100	2.2	21.6	28.4	19.8	8.3	7.8	5.3	2.2	2.8	1.1
	Females..	899	100	3.7	18.7	26.5	20.2	11.7	6.7	5.9	2.8	2.2	.4
1895.	Males.....	577	100	4.9	17.1	19.8	16.8	13.5	9.2	6.1	6.1	3.8	.9
	Females..	689	100	3.9	17.1	21.3	15.4	11.2	8.6	10.1	6.1	3.9	1.5
1896.	Males.....	339	100	2.9	14.5	15.3	18.3	16.5	10.3	9.1	4.7	2.9	2.1
	Females..	426	100	1.6	16.4	21.4	13.8	16.2	15.7	5.6	4.9	3.3	.5
1897.	Males.....	424	100	5.2	17.2	22.4	17.5	24.5	7.1	3.5	1.2	.9	.5
	Females..	488	100	4.1	16.6	22.1	17.0	25.8	8.8	3.7	.6	.6	0
1893-97.	Males.....	2,788	100	3.9	20.3	22.8	17.2	13.7	8.9	5.3	3.5	2.4	1.1
	Females..	3,311	100	3.6	19.2	23.7	16.9	13.9	9.7	5.9	3.2	2.4	.5

RÖTHELN (GERMAN MEASLES) IN MICHIGAN IN 1897.

During the year ending December 31, 1897, there were reported to the Secretary of the State Board of Health 8 outbreaks of rōtheln, in 8 localities, resulting in 24 cases and no deaths.

The main reason for efforts for the restriction of rōtheln is the fact that scarlet fever is so often mistaken for rōtheln, so that in restricting what is apparently rōtheln a more fatal disease is sometimes restricted.

In all cases the public health should be given the benefit of any doubt, and precaution taken against the spread of any contagious disease which may prove to be dangerous.

TYPHOID FEVER IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1897.

During the year ending December 31, 1897, there were reported to the Secretary of the State Board of Health 584 outbreaks of typhoid fever (includes "typho-malarial") in 500 localities in Michigan in which there were reported to have occurred 1,900 cases and 352 deaths. Notwithstanding the marked improvement which the State Board of Health has succeeded in bringing about both in promptness and accuracy of reports of local health officials to the central office, it is still probable that not all cases of sickness and deaths from typhoid fever are yet reported.

TYPHOID FEVER IN 1897, COMPARED WITH PREVIOUS YEARS.

Comparisons with previous years, to ascertain the comparative increase or decrease of the prevalence of typhoid fever in this State, are interesting and instructive, and they would be more so if there existed a fixed basis on which to found such comparisons; but from year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by the local health officials throughout the State to furnish in their reports the information desired by the State Board. It is, therefore, still impossible to determine the exact increase or decrease of prevalence of the disease in this State by comparisons of the numbers of outbreaks of the disease, and the cases and deaths reported to this Office year by year. This fact should be borne in mind when referring to Table 1.

Typhoid fever occurs in waves, the principal waves appearing to be about twelve years apart, with one or two minor waves intervening. This may be seen by referring to Table 2 and to the diagram, printed on page 278. Report of this Board for 1895, representing the number of deaths per 100,000 persons living. The diagram shows that there has been a considerable reduction in the mortality-rates from typhoid fever in Michigan, especially since 1873. The cause for the great rise in typhoid fever in certain years is to be sought for in the fouling of the water supply; and so far as relates to country districts and places depending upon wells for a water supply, the cause is to be sought for in the lessening of the ground water, in wells, etc., as has been pointed out in the preceding reports. Possibly also, in filthy places, the extreme dryness of the surface soil may be found to have causal relation, because the germs are not destroyed at once by drying, and may, therefore, be wafted about by currents of air. The above-mentioned Table 2 and the illustrative diagram probably quite accurately represent the annual fluctuations of, though not the total deaths from, typhoid fever in Michigan during the twenty-seven years, 1868-94, as the law for collecting and compiling this information in the office of the Secretary of State has remained nearly the same throughout the twenty-seven years.

TABLE 1.—TYPHOID FEVER.—*Exhibiting the numbers of Outbreaks, Localities, Cases and Deaths reported for each of the fourteen years, 1884-97; also for some of those years the average Cases and Deaths per Outbreak, the Deaths to 100 Cases, and the number of Special Final reports received.*

Year.	Outbreaks Reported.	Localities Reported.	Cases Reported.	Deaths Reported.	Average Cases per Outbreak.	Average Deaths per Outbreak.	Deaths per 100 Cases.	Final Reports Received.
1884.....	-----	245	969	290	-----	-----	27	-----
1885.....	218	200	715	194	3.28	.89	23	-----
1886.....	290	282	1,194	282	4.15	.75	18	60
1887.....	335	320	3,424	411	*7.24	*1.23	17	46
1888.....	316	296	1,511	310	4.78	.98	21	60
1889.....	432	398	2,530	402	†5.17	†.93	†18	115
1890.....	330	310	1,924	304	5.83	.92	16	135
1891.....	543	501	4,670	697	8.60	1.28	15	208
1892.....	527	484	2,591	538	4.92	1.02	21	216
1893.....	545	504	‡3,512	594	6.44	1.09	17	230
1894.....	600	530	2,805	506	4.67	.84	18	321
1895.....	800	695	3,751	621	4.69	.78	17	449
1896.....	642	543	2,506	409	3.90	.64	16	417
1897.....	584	500	1,900	352	3.25	.60	19	386
Averages, 1886-97..	495	447	2,693	452	5.44	.91	17	220

* The large average numbers of cases and deaths per outbreak in 1887 is partially accounted for by the fact that in two outbreaks the disease became epidemic, resulting in an aggregate of 535 cases and 73 deaths.

† In computing the average numbers of cases and deaths per outbreak, and the per cent ratio of deaths to cases in 1889, the outbreak at Negaunee, in which 300 cases were reported, is omitted, because the number of deaths which occurred in that outbreak was not reported.

‡ The large number of cases reported in 1893 is accounted for by the fact that in Ironwood the disease became epidemic, and the one outbreak resulted in 824 cases and 33 deaths.

Study of Table 1 shows that, as compared with 1896, there were reported in 1897, nine per cent less outbreaks, twenty-four per cent less cases of sickness and fourteen per cent less deaths from typhoid fever.

Although the outbreaks, cases, deaths and the average numbers of cases and deaths per outbreak were less in 1897 than in 1896, the fatality, *i. e.*, the per cent of cases which proved fatal, was *greater* in 1897 than in 1896.

TABLE 2.—*Exhibiting the Population of Michigan for the year 1897, by tiers of counties (Upper Peninsula as one tier); also the number of cases of, and deaths from, Typhoid Fever reported from each of the divisions for 1897, and the numbers of cases and deaths per 10,000 population of each division.*

Counties in Groups, most Northern ones First.			Estimated Population 1897.*	Reported Cases of Typhoid Fever, 1897.	Reported Cases per 10,000 of Population.	Reported Deaths from Typhoid Fever, 1897.	Reported Deaths per 10,000 of Population.
State			2,352,455	1,900	8.08	352	1.50
Upper Peninsula.....	Alger. Delta. Schoolcraft. Luce. Houghton. Ontonagon. Gogebic. Baraga.	Mackinac. Chippewa. Keweenaw. Marquette. Iron. Menominee. Dickinson.	226,143	240	10.61	36	1.59
Eleventh tier of counties..	Emmet. Charlevoix. Leelanau.	Cheboygan. Presque Isle.	46,408	48	10.34	15	3.23
Tenth tier of counties....	Antrim. Otsego. Montmorency.	Alpena.	52,218	40	7.66	9	1.72
Ninth tier of counties.....	Benzie. G'd Traverse. Kalkaska. Manistee.	Crawford. Oscoda. Alcona.	46,497	32	6.88	6	1.29
Eighth tier of counties.....	Wexford. Missaukee. Roscommon.	Ogemaw. Iosco.	69,267	18	2.60	6	0.87
Seventh tier of counties..	Mason. Lake. Osceola. Clare.	Gladwin. Bay. Huron. Arenac.	164,859	156	9.46	31	1.88
Sixth tier of counties.....	Oceana Newaygo. Mecosta. Isabella.	Midland.	95,459	75	7.86	15	1.59
Fifth tier of counties.....	Muskegon. Montcalm. Gratiot. Saginaw.	Tuscola. Sanilac.	251,793	173	6.87	31	1.23
Fourth tier of counties.....	Ottawa. Kent. Ionia. Clinton.	Shiawassee. Genesee. Lapeer. St. Clair.	395,525	301	7.61	47	1.19
Third tier of counties	Allegan. Barry. Eaton. Ingham.	Livingston. Oakland. Macomb.	233,901	197	8.42	29	1.24
Second tier of counties..	Van Buren. Kalamazoo. Calhoun. Jackson.	Washtenaw. Wayne.	537,157	443	8.25	89	1.66
First tier of counties.....	Berrien. Cass. St. Joseph. Branch.	Hillsdale. Lenawee. Monroe.	233,301	177	7.59	38	1.63

* Population estimated by average annual increase, arithmetical method, based on U. S. Census of 1890 and the State Census of 1894, computed in the office of the State Board of Health.

TABLE 3.—Numbers of Cases and Deaths reported from Typhoid Fever, and the Cases and Deaths per 10,000 persons living in each county in Michigan during the year 1897. (Compiled from reports of health officers, clerks, etc.)

Counties.	Population of Mich- igan for 1897.*	Number of reported		Number per 10,000 population, of		Counties.	Population of Mich- igan for 1897.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,352,455	1,900	352	8.08	1.50	Keweenaw... Lake.....	2,873 5,441	1 1	0 0	3.48 1.84	0 1.84
Alcona.....	5,425	18	1	33.18	1.84	Lapeer.....	28,628	34	8	11.88	2.79
Alger.....	1,495	4	0	26.76	0	Leelanau....	10,624	3	0	2.82	0
Allegan.....	39,360	21	4	5.34	1.02	Lenawee....	48,611	43	6	8.85	1.23
Alpena.....	19,319	31	5	16.05	2.59	Livingston..	20,121	10	1	4.97	0.50
Antrim.....	13,938	5	3	3.59	2.15	Luce.....	2,268	0	0	0	0
Arenac.....	7,888	5	0	6.34	0	Mackinac....	6,792	2	0	2.94	0
Baraga.....	5,129	1	1	1.95	1.95	Macomb.....	32,818	23	6	7.01	1.83
Barry.....	23,636	18	1	7.62	0.42	Manistee....	27,527	6	3	2.18	1.09
Bay.....	64,973	90	16	13.85	2.46	Marquette... Mason.....	39,454 19,950	52 6	8 2	13.18 3.01	2.03 1.00
Benzie.....	10,183	6	1	5.89	0.98	Mecosta.....	21,503	20	5	9.30	2.33
Berrien.....	48,898	48	16	9.82	3.27	Menominee... Midland....	24,646 15,139	12 12	8 3	4.87 7.93	3.25 1.98
Branch.....	25,769	27	6	10.48	2.33	Missaukee....	8,385	1	0	1.19	0
Calhoun.....	50,450	74	16	14.67	3.17	Monroe.....	33,814	24	4	7.10	1.18
Cass.....	21,343	10	2	4.69	0.94	Montcalm....	35,299	40	7	11.33	1.98
Charlevoix... Cheboygan...	12,012 15,336	15 8	6 0	12.49 5.22	5.00 0	Montmorency Muskegon...	3,157 35,307	1 12	1 2	3.17 3.40	3.17 0.57
Chippewa.... Clare.....	17,799 8,290	45 10	3 3	25.28 12.06	1.69 3.62	Newaygo..... Oakland....	18,112 43,749	6 24	4 4	3.31 5.49	1.10 0.91
Clinton..... Crawford....	26,077 2,521	21 0	2 0	8.05 0	0.77 0	Oceana..... Ogemaw.....	17,275 5,679	19 1	4 1	11.00 1.76	2.32 1.76
Delta..... Dickinson....	22,211 15,261	27 16	7 1	12.16 10.48	3.15 0.66	Ontonagon... Osceola.....	9,211 17,859	13 8	0 1	14.11 4.48	0 0.56
Eaton..... Emmet.....	33,011 12,231	15 25	3 9	4.54 20.44	0.91 7.36	Oscoda..... Otsego.....	1,733 5,186	0 0	0 0	0 0	0 0
Genesee..... Gladwin.....	41,395 5,419	21 22	1 1	5.07 40.60	0.24 1.85	Ottawa..... Presque Isle..	41,877 6,829	14 0	9 0	3.84 0	2.15 0
Gogebic..... G'd Traverse..	14,771 20,635	9 7	0 4	6.09 3.39	0 1.94	Rosecommon.. Saginaw.....	1,375 81,528	0 18	0 7	0 2.21	0 0.86
Gratiot..... Hillsdale....	28,857 29,981	19 8	3 1	6.58 2.67	1.04 0.33	Sanilac..... Schoolcraft..	34,962 8,109	47 0	8 0	13.44 0	2.29 0
Houghton... Huron.....	50,630 35,039	42 14	7 7	8.30 4.00	1.35 2.00	Shiawassee... St. Clair....	34,251 55,983	23 28	2 5	6.71 5.00	0.58 0.89
Ingham..... Ionia.....	41,206 36,334	86 33	10 5	20.87 9.08	2.43 1.38	St. Joseph... Tuscola.....	24,885 35,840	17 37	3 4	6.83 10.32	1.21 1.12
Iosco.....	10,177	3	1	2.95	0.98	Van Buren... Washtenaw..	31,447 44,483	26 8	7 1	8.27 1.80	2.23 0.22
Iron.....	5,494	16	1	29.12	1.82	Wayne..... Wexford.....	318,971 16,124	233 7	50 1	7.30 4.34	1.57 0.62
Isabella..... Jackson.....	23,430 47,663	18 38	1 6	7.68 7.97	0.43 1.26						
Kalamazoo... Kalkaska....	44,143 6,000	64 1	9 0	14.50 1.67	2.04 0						
Kent.....	130,950	127	15	9.70	1.15						

*Population estimated by average annual increase (arithmetical methods), based on U. S. Census of 1890 and the State Census of 1894. Computed in the office of the State Board of Health.

DISTRIBUTION OF TYPHOID FEVER IN MICHIGAN IN 1897.

BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.



Σ = Localities; O = Outbreaks; C = Cases per 10,000 population; D = Deaths per 10,000 population.

[PLATE 994.]

Sickness-rates from Reported Typhoid Fever in 1897.

Tables 2 and 3 show that the sickness-rate from typhoid fever in Michigan in 1897 was 8.08 per 10,000 of population of the State. This sickness-rate is considerably lower than that of any of the immediately preceding six years; and much less (6.8 cases per 10,000 population) than the average rate for those six years.

Table 2 shows that the Upper Peninsula tier of counties had the greatest sickness-rate and the eighth tier of counties the least sickness-rate from this disease in 1897; also, that for this year, the sickness-rates in

the second, third, seventh, eleventh and Upper Peninsula tiers were higher, and in the first, fourth, fifth, sixth, eighth, ninth and tenth tiers they were lower than the average sickness-rate for the State.

From Table 3 it may be seen that of the counties in Michigan in 1897, Gladwin had the greatest sickness-rate (40.60) and Missaukee the least sickness-rate (1.19) per 10,000 population. Other counties which had exceptionally high sickness-rates were Alcona, 33.18; Iron, 29.12; Alger, 26.76; and Chippewa, 25.28 cases per 10,000 inhabitants. Counties which had unusually low sickness-rates were Kalkaska, 1.67; Ogemaw, 1.76; Washtenaw, 1.80; Lake, 1.84 and Baraga, 1.95 cases per 10,000 inhabitants.

Death-rates from Reported Typhoid Fever in 1897.

Table 2 shows, by tiers of counties, the highest death-rate (3.23 deaths per 10,000 inhabitants) was in the eleventh tier, and the lowest death-rate (.87 of one death per 10,000 inhabitants) was in the eighth tier of counties. The Upper Peninsula, tenth, seventh, sixth, second and first tiers each had a higher death-rate than the average death-rate for the State; and the third, fourth, fifth and ninth tiers each had a lower death-rate than the average rate for the whole State.

Table 3 shows that the county having the highest death-rate (7.36 deaths per 10,000 inhabitants) was Emmet, whose death-rate was nearly five times the average rate for the State. Of counties from which deaths were reported, the lowest rate (.22 of one death per 10,000 inhabitants) was Washtenaw county.

In ten counties—Alger, Arenac, Cheboygan, Gogebic, Kalkaska, Keeweenaw, Leelanau, Mackinac, Missaukee and Ontonagon—from which an aggregate of 47 cases of typhoid fever was reported, no deaths from that disease occurred. From seven counties—Crawford, Luce, Oscoda, Otsego, Presque Isle, Roscommon and Schoolcraft—having an aggregate population of 28,021, there was not a case of typhoid fever reported.

Sickness and Death-rates from Typhoid Fever Higher in Thickly Inhabited Localities.

Numerous instances, taken from the compilations of the reports of health officers for various years, seem to demonstrate beyond a doubt that the sickness and death-rates are higher in the thickly-settled than in the rural districts. Results of a study of this subject are given in Table 11 of the Summary relative to Communicable Diseases, on page 389 of the Annual Report of this Board for 1897.

*Typhoid Fever in Each Month of the Year 1897.*TABLE 4.—*Exhibiting the reported number of outbreaks of Typhoid Fever which Began, the number which Ended, and the number of Outbreaks which were Present, in each month of the year 1897, in the different local jurisdictions of Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Outbreaks began..	27	18	14	18	19	19	30	73	102	108	61	28	517
Outbreaks ended..	3	21	18	16	20	12	12	17	45	92	86	93	435
Outbreaks present	35	48	41	39	41	40	60	119	204	259	228	168	-----

The last line of figures in Table 4, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the time of the beginning of an outbreak is reported, but the time of the ending of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 82 more beginnings than endings of outbreaks reported during the year 1897.

TABLE 5.—*Exhibiting the Number and Per Cent of Cases of Typhoid Fever in Michigan in each Month during the Year 1897. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases sick in any part of the month....	93	101	82	70	76	73	106	204	399	539	506	349
Per cent the cases sick in each month were of total reported cases.....	5	5	4	4	4	4	6	11	21	28	27	18

The first line of figures in Table 5 shows the number of cases reported sick in any part of each month. As some of the cases were sick longer than one month, they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1897; and as the last line of figures in this table shows the per cent the cases sick in each month were of the exact number of cases reported to this office in 1897, the sum of the figures in the last line of the table exceeds 100.

Source of Contagium of Typhoid Fever.

EXHIBIT I.—*The reported "Source of Contagium" of Cases of Typhoid Fever in Michigan during the year 1897.*

Reported Sources.	Cases.
Traced to former cases.....	166
Probably traced to former cases.....	3
Attributed to infected, contaminated, or surface water.....	455
Cases reported as coming from outside jurisdictions.....	111
Attributed to defective sewerage or drainage.....	12
Attributed to filthy or unsanitary conditions.....	72
Contaminated milk or food supply.....	56
Cases, the sources of contagium of which were reported as unknown.....	632
Cases, the sources of contagium of which were not reported, or the statements were too indefinite for classification.....	393
Total.....	1,900

Wells Within One Hundred Feet of a Privy.

Bearing on the subject of contaminated water supply as a source of contagium in typhoid fever in Michigan, of the 386 final reports received at this office from health officers relative to outbreaks of typhoid fever in Michigan in 1897, forty-one per cent contained statements that privies existed within 100 feet of wells from which water was used for drinking and culinary purposes.

This fact probably indicates that a considerable portion of the population of the State is, under certain conditions, liable to infection by germs of typhoid fever through contaminated well water.

Outbreaks Attributed to Infected, Contaminated or Impure Water.

The following are extracts from reports by a few of the health officials, who attributed the cause of 455 cases of typhoid fever, in their jurisdictions, to infected, contaminated, impure or surface water,—with the name of the health officer (or other official) and the name of the jurisdiction subjoined:

- "Contaminated wells."—*G. W. Forrest, M. D., Manlius township, Allegan county.*
 "The patient has been in the habit of drinking water from an old spring, where he had been at work."—*Aleck F. Hutchinson, M. D., Johnstown township, Barry county.*
 "Caused by drinking impure water or surface water which was contaminated with filth."—*Thos. N. Stafford, M. D., Weesaw township, Berrien county.*
 "It originated from drinking water from a well which was too near horse-barn."—*F. L. Hoffman, M. D., LeRoy township, Calhoun county.*
 "Boy drank out of an old well while playing ball on the common in Battle Creek, Mich., about ten days before taken sick. No other members of this family being taken since."—*R. M. Gubbins, M. D., Marshall township, Calhoun county.*
 "From surface water."—*W. C. Culcheon, M. D., LaGrange township, Cass county.*
 "Bad water. Privy and barn-yard too close to well."—*Lucian Lemke, H. O., Paris township, Huron county.*
 "From contaminated water. All cases used water from same well."—*D. Duncan, H. O., Prairie Ronde township, Kalamazoo county.*
 "Drinking impure water."—*D. J. Wallace, M. D., Sparta village, Kent county.*

"Impure water taken from surface wells"—*Alexander Magill, M. D., Midland City, Midland county.*
 "From drinking water from a hole in cellar."—*J. N. Hathaway, H. O., Royal Oak township, Oakland county.*

"I believe through drinking water. In two families using water from first well there were 7 cases taken from Nov. 9 till 21st, 1897. Said well located about 40 feet from one closet and 80 from another; also about 25 or 30 feet from a drain used as a sewer."—*Geo. B. Hammond, M. D., Royal Oak village, Oakland county.*

"Impure water. The well which supplied the house received the sewage from a barn-yard across the road."—*J. W. Anderson, M. D., Troy township, Oakland county.*

"I suspect a shallow well. A spring in the cellar of patient's house."—*Amos S. Wheelock, M. D., Atlas township, Genesee county.*

Typhoid Fever in Onekama Township Attributed to Contaminated Water.

In July, 1897, a case of typhoid fever which resulted in death was reported to this office from Onekama township, Manistee county. The patient was a young lady 18 years of age.

August 10, 1897, the father of the decedent wrote to this office as follows relative to the case:

"I would like to know your opinion. My daughter of eighteen years old died with Typhoid Fever—so the doctor called it. Is typhoid fever brought on no other way than by *bad water*? My well was about six feet deep; serves water 3 by 3 wide and we have been using water out of it for the last twelve years. This spring we had much rain and had about 4 feet of water in it but we have 5 head of horses and three cows which have daily been watered out of it, besides what we used in the house. Is it possible that water could get bad where there is so much of it used out of a well? The well is about ten rods from the barn but overflowing in heavy rain it could not get there. The only way would be by leaching through the sand; but I have dug alongside the barn and all around between the well and barn and find no water and no *clay to hold water*; nothing but sand, and I am at a loss to know what caused my daughter to get typhoid fever.

"Is it not the physician's duty who attended my daughter through her sickness, to tell us of its spreading among our family and show us prevention?"

August 12, 1897, in reply to this letter the Secretary wrote:

"Replying to your letter of Aug. 10, relative to typhoid fever, I send you by this mail a number of pamphlets and diagrams which will give you full information relative to the modes of spreading and the best methods of restricting typhoid fever. That disease is not always spread by bad water, but it is more frequently spread by that manner than any other. Any well which is not more than six feet deep is liable to be contaminated, because the quantity of earth through which the water in such a well is filtered is comparatively little. This is especially true in sandy soil. On the second page of the leaflet on typhoid fever, which I send you by this mail, you will see an instance where the well received the water which came down as rainfall thirty rods distant from the well.

"Where water is suspicious, as for instance in your well, the proper way is to drink none of it until it has been boiled. After boiling it can be set aside and allowed to become cool before being drunk. But it should be kept covered so that no infectious dust can reach it.

"I think it is a physician's duty to warn members of a household in which typhoid fever occurs, of the danger of its being spread, and to tell them how to prevent it from spreading.

"It is generally believed that typhoid fever is a disease which will run its course in spite of medical treatment. However, there are many who believe that by proper medical treatment it may be shortened. I think that is sometimes possible.

"If this office can be of any further service to you, it will give me pleasure."

Water in Sparta Village Suspected of Causing Typhoid Fever.

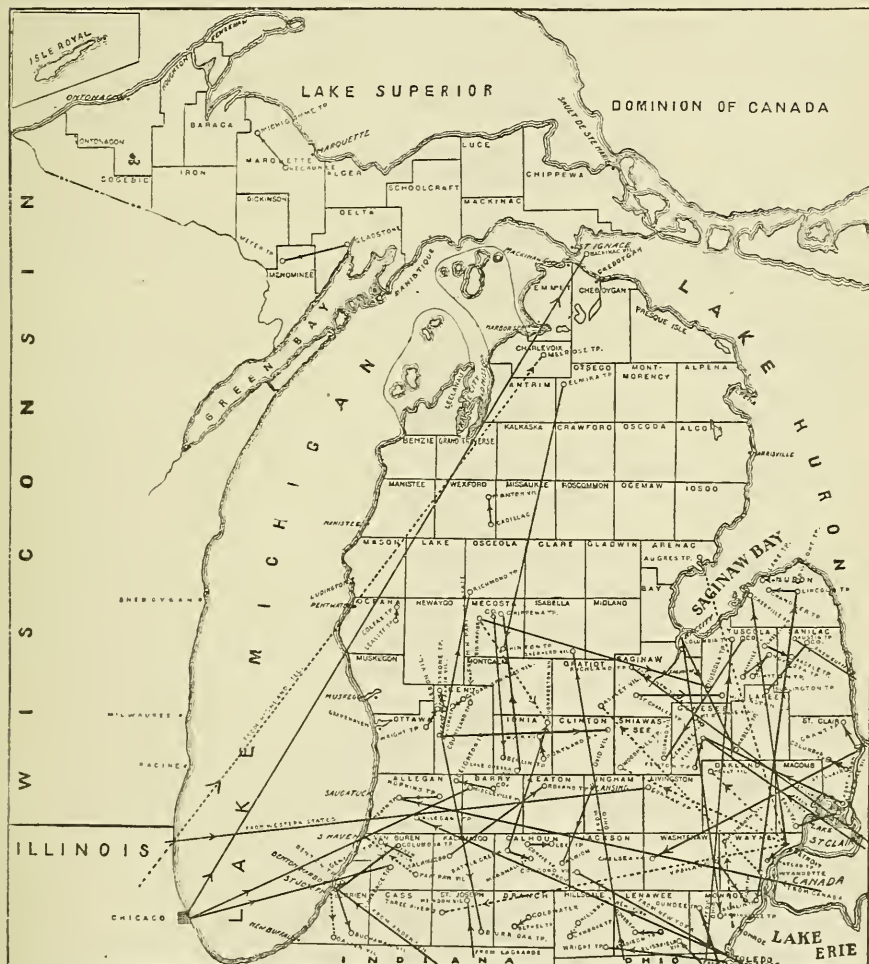
November 11, 1897, D. J. Wallace, health officer of Sparta village, Kent county, wrote as follows to the Secretary of this Board relative to the cause of an outbreak of typhoid fever in his jurisdiction:

"I have 4 cases of typhoid fever in one family here and the sanitary conditions are far above the average and I pronounce them good. The members of the family sick with the disease have not been away from home at any time to contract the disease elsewhere and unless the cause lies in their drinking water I am unable to trace it. I have ordered the use of the water from this well discontinued and send a sample to you by express today for analysis as to the presence of typhoid fever and hope you will be able to comply with our request in this matter and return me the result of your investigation. The well from which the water is obtained is 20 feet deep; is an open, cement well, located about 20 or 30 rods from a cemetery and the surface water flows from the direction of the cemetery, passes this house and empties into a creek nearby. Desiring your assistance in this case I remain, etc."

The sample of water mentioned by Dr. Wallace was forwarded to Dr. Victor C. Vaughan, Director of the State Laboratory of Hygiene with request that it be subjected to rigid examination and the condition of the water reported to this office.

December 22, 1897, relative to this sample of water Dr. Vaughan wrote to the Secretary of this Board: "It was examined, but no pathogenic germ was found in it."

MOVEMENTS OF CONTAGIUM OF TYPHOID FEVER IN 1897.



THIS MAP ILLUSTRATES TABLE 7. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS INDICATE THE DIRECTIONS OF THE MOVEMENTS. —————> DEFINITELY TRACED. - - - - -> PROBABLY TRACED.

[PLATE 986.]

TABLE 6.—*First, second and third localities, where the second locality was infected with Typhoid fever from the first, and the third was infected from the second; and the numbers of cases and deaths from Typhoid Fever in the first, second and third localities, with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Allegan county: Hopkins township.....	*	---	Allegan county: Heath township..... (Sept. 25-Oct. 28.)	1	0			
Barry county.....			Allegan county: Leighton township..... (Oct. 4-Oct. 31.)	1	0			
Bay county: Bay city..... (1896-Feb., 1898.)	62	6	Lapeer county: Hadley township..... (Jan. 3-Feb.)	1	0			
Berrien county: Benton Harbor city.... (Aug. 10-Sept. 18.)	1	0	Monroe county: Raisinville township.. (Nov. 1-Dec. 1.)	1	0			
Berrien county: St. Joseph city.....	*	---	Berrien county: Buchanan village..... (Oct. 1-Nov.)	1	0			
Branch county: Coldwater city..... (Apr. 4-Oct.)	5	1	Berrien county: Benton township..... (Apr. 14-May 18.)	1	0			
Calhoun county: Battle Creek city..... (Sept. 10-Dec. 30.)	38	6	Branch county: Bethel township..... (July 28-Aug. 3)	1	1			
Calhoun county: Convis township..... (Oct. 15 —.)	8	1	Calhoun county: Marshall township.... (Sept. 30-Oct. 12.)	1	1			
Delta county: Gladstone city..... (Sept. 1-Dec. 31.)	7	1	Ionia county: Hubbardston village.. (Sept.-Oct. 30.)	1	0			
Genesee county: Fenton township.....	*	---	Calhoun county: Lee township..... (Dec. 6-Jan. 14, 1898.)	3	1			
Genesee county: Mt. Morris village..... (July-Nov. 22.)	4	0	Menominee county: Meyer township..... (Dec. 8-Dec. 19.)	1	1			
Huron county: Lincoln township..... (Jan. 11-Jan. 31.)	1	0	Genesee county: Flint city..... (Aug. 12-Sept. 11.)	2	0			
Ingham county: Lansing city..... (June 25-Apr. 1898.)	43	9	Genesee county: Genesee township..... (Aug. 2-Sept. 28.)	3	0			
Ionia county: Lake Odessa village.... (Sept. 8-Oct. 27.)	2	0	Huron county: Chandler township.... (Feb. 6-Feb. 22.)	1	0			
			Calhoun county: Albion city..... (Aug. 3-Mar. 30.)	6	1			
			Mecosta county: Chippewa township... (Oct. 7-Nov. 18.)	1	0			

* Typhoid fever was not reported to this Office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 6.—CONTINUED.—*Movement of Infection.*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Ionia county: Portland village.....	*	—	Ionia county: Muir village..... (Aug. 27-Dec. 9.)	7	0			
Kalamazoo county: Kalamazoo city..... (Aug. 28-Oct., 1898.)	88	9	Eaton county: Roxand township..... (Nov. 9-Dec. 23.)	1	0			
Kent county: Cedar Springs village.. (November 1-Dec. 17.)	1	0	Kent county: Algoma township.....	1	0			
			{ Clinton county: Ovid village..... (Sept. 2-Nov. 20.)	3	1			
Kent county: Grand Rapids city..... (Jan. 4-Jan. 23, 1898.)	109	12	{ Osceola county: Richmond township... (Sept. 1-Nov. 2.)	4	0			
			{ St. Joseph county: Burr Oak township.... (July 7-Sept.)	2	0			
Kent county: Sparta village..... (Aug. 14-Jan. 1, 1898)	4	0	Kent county: Tyrone township..... (Nov. 5-Dec. 20.)	2	0			
Lenawee county: Madison township..... (Sept. 10-Nov. 24.)	3	1	Lenawee county: Dover township..... (—Oct. 24.)	2	0			
Marquette county: Negaunee city.....	15	1	Marquette county: Michigamme township (Oct. 15-Nov. 26.)	1	0			
Mecosta county: Big Rapids city..... (Sept.-Dec. 22.)	6	3	Tuscola county: Tuscola township..... (Sept. 4-Jan. 30, 1898.)	3	1			
Mecosta county.....	—	—	Ionia county: Berlin township..... (Mar. 1-May 6.)	1	1			
Oceana county: Leavitt township.....	*	—	Oceana county: Colfax township..... (May 1-May 20.)	3	1			
Otsego county: Elmira township.....	*	—	Mecosta county: Hinton township..... (Dec. 12-1898.)	1	0			
Ottawa county: Wright township.....	*	—	Kent county: Lisbon village..... (Aug. 3-Aug. 24.)	1	1			
Saginaw county: St. Charles township...	*	—	Tuscola county: Millington township... (Oct. 3-Jan. 1, 1898.)	5	0			
Sanilac county.....	—	—	Lapeer county: Burlington township... (Sept. 28-Oct. 17.)	1	0			
St. Clair county: Algonac village..... (Aug. 8-Oct. 1.)	1	0	Genesee county: Flint city..... (Aug. 12-Sept. 11.)	2	0			
St. Clair county: Port Huron city..... (Aug. 8-1898.)	24	5	{ St. Clair county: Grant township..... (Oct. 26—)	1	0			
			{ Washtenaw county: Chelsea village..... (Aug. 26-Oct. 16.)	1	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 6.—CONTINUED.—*Movement of Infection*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
St. Clair county: St. Clair city.....	5	1	St. Clair county: Columbus township.... (Aug. 9–Nov. 25.)	3	0	Tuscola county: Dayton township (Nov. 26–Jan. 5, 1898.)	1	0
St. Clair Flats.....			Macomb county: Erin township..... (Oct. 4–Oct. 30.)	1	0			
Tuscola county: Cass City village.....	1	0	Sanilac county: Argyle township.....	3	0			
Tuscola county: Mayville village..... (Aug.–Sept. 1.)	1	0	Tuscola county: Novesta township..... (Oct. 15–Feb. 8, 1898.)	2	0			
Tuscola county.....			Shiawassee county: Durand village..... (Feb. 17–Mar. 25.)	1	0			
Washtenaw county: Ypsilanti city..... (—, Nov. 15.)	1	1	Monroe county: Ash township..... (Oct. 1–Oct. 23.)	1	1			
Wayne county: Detroit city..... (Jan. 2–Jan 1, 1898.)	149	43	Huron county: Caseville township.... (Aug. 4–Aug. 20, 1898.)	1	1			
Wayne county: Wyandotte city..... (1896–1898.)	71	8	Wayne county: Taylor township..... (Dec. 10–Mar. 1898.)	1	0			
Wexford county: Cadillac city.....	*		Huron county: Lincoln township..... (Oct. 5–.)	1	0			
Western States.....			Monroe county: Berlin township..... (Nov. 13–Dec. 6.)	2	0			
			Wexford county: Manton village..... (Oct. 10–Dec. 20.)	1	1			
			Livingston county: Conway township..... (Dec. 7–Jan. 1898.)	2	0			
Movement of Infection of Typhoid Fever into Michigan from outside the State.								
Africa.....			Van Buren county: Geneva township..... (Oct. 17–Oct. 30.)	2	2			
Canada.....			Allegan county: Heath township..... (Oct. 24–Dec. 8.)	1	0			
Chicago.....			Barry county: Middleville village.... (Dec. 26–Feb. 4, 1898.)	1	0			
			Mackinac county: Mackinac village..... (Oct. 18–Dec. 20.)	1	0			
			Van Buren county: Lawrence township... (Oct. 2–Feb. 9, 1898.)	6	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 6.—CONTINUED.—*Movement of Infection of Typhoid Fever into Michigan from outside the State.*

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Indiana: Anderson.....			Berrien county: Benton Harbor city.... (Oct. 12-Feb. 1898)	4	0	Van Buren county: Columbia township.... (Oct. 22-Oct. 25.)	1	0
Indiana: Lagrange.....			St. Joseph county: Mendon village..... (Nov. 1-Dec. 4.)	1	0			
			{ Allegan county: Allegan township..... (Oct.-Oct. 29.)	1	1			
New York.....			{ Jackson county: Concord village..... (Sept. 10-Oct. 7.)	1	0			
			{ Saginaw county: Richland township.... (Oct. 5-Dec.)	1	0			
New York: Buffalo.....			Sanilac county: Austin township..... (Dec. 20-Jan. 25.)	2	0			
Ohio: Bowling Green.....			Lenawee county: Blissfield village..... (Sept. 14-Nov. 1.)	1	0			
			{ Hillsdale county: Wright township..... (Dec. 10-Jan. 20.)	2	0			
Ohio: Toledo.....			{ Monroe county: Dundee township..... (Sept. 2-Oct. 13.)	1	1			
			{ Isabella county: Shepherd village..... (Oct. 20-Dec. 18.)	3	1			
Ohio.....			{ Tuscola county: Columbia township.... (Sept. 20 Sept. 30.)	1	1			
Syria.....			Genesee county: Flint city..... (Aug. 21-Aug. 31.)	1	1			
Probable Movement of Infection of Typhoid Fever.								
Berrien county: St. Joseph city.....	*		Berrien county: Gallen village..... (Oct. 26-Nov. 6.)	1	1			
Hillsdale county: Hillsdale city.....	*		Hillsdale county: Cambria township.... (Nov. 7-Dec. 15.)	1	0			
Huron county: Dwight township.....	*		Huron county: Lake township..... (June 15 —.)	1	1			
Mecosta county: Big Rapids city..... (Sept. 30-Dec. 22.)	6	3	Ionia county: Hubbardston village.. (Oct.-Dec. 13.)	2	0			
Monroe county: Monroe city.....	3	0	Wayne county: Plymouth village.....	1	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 6.—CONCLUDED.—**Probable Movement of Infection of Typhoid Fever.**

First Localities from which Typhoid Fever was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Van Buren county: Paw Paw village.....	*	—	Van Buren county: South Haven village. (Aug. 25-Dec. 20.)	3	1			
			Arenac county: An Gres township.... (July 18-Sept. 10.)	2	0			
			Oakland county: Holly village..... (Oct. 18-Nov. 5.)	1	1			
Wayne county: Detroit city..... (Jan. 2-Jan. 1, 1898.)	149	43	Shiawassee county: Woodhull township... (Oct. 19-Nov. 16.)	2	0			
			St. Joseph county: Three Rivers city.... (Aug. 1-Sept. 4.)	1	0			
Wayne county: Wyandotte city..... (Jan. 5-1898.)	71	8	Gratiot county: Ashley village..... (Sept. 26 —.)	3	0			
North part of State	—	—	Kent county: Courtland township... (Nov. 24-Jan. 8, 1898.)	1	0			
Probable Movement of Infection of Typhoid Fever into Michigan from outside the State.								
Illinois: Highland.....	—	—	Charlevoix county: Melrose township..... (Aug. 1 —.)	3	0			

* This foot-note is on the bottom of the first page of this table.

Typhoid Fever in Boyne Falls Village.

Relative to typhoid fever in Boyne Falls village, the clerk of the village, P. M. Hood, wrote to the Secretary of State, November 19, 1897, as follows:

"One of the families in our village has been afflicted with typhoid fever, four cases have already occurred in this family. I presume they have been reported to you by the health officer.

"The cause of the fever is unknown unless it may be the drinking water, which is obtained from a well which is less than 50 feet from a privy.

"The family are poor and unable to pay for an analysis of the water, and I desire to know whether you will have an analysis made if a sample is sent you by express prepaid. As usual the family will not admit that anything can be wrong with the water but are willing to have an analysis made, and if it is proved that the water is the cause they will abandon the well."

The Secretary of State referred the above-quoted letter to the Secretary of this Board for answer; and Nov. 23, 1897, the Secretary of this Board wrote as follows to Mr. Hood:

"Relative to the examination of well water, the last legislature passed a law providing for the examination of drinking water, and herewith I enclose a copy of the law. If you should decide to have the water analyzed, I think it would be well for you to correspond with Prof. Victor C. Vaughan, M. D., Director of the State Laboratory of Hygiene, Ann Arbor, Mich., relative to the subject, who will inform you just how to proceed, and the probable expense to your township.

"I trust that you have reported the cases to the health officer, as the law requires that all cases of any disease dangerous to the public health shall be reported directly to the health officer."

Following is copy of the law mentioned by the Secretary in his letter to Mr. Hood:

ACT NO. 43, LAWS OF MICHIGAN, 1897. AN ACT TO PROVIDE FOR THE ANALYSIS OF WATER IN USE BY THE PUBLIC IN CERTAIN CASES.

SECTION 1. *The People of the State of Michigan enact.* That in any case where any city, village or township in this State shall be supplied with water for domestic uses by any individual, company or corporation, city or village, or where there is within such city, village or township any water in swales, wells, rivers or other places, which might be the cause of disease or epidemic, a sample of such water may be sent to the University of Michigan for analysis, by the mayor of such city or village, or the president of such village, or by any aldermen or trustee of such village, or by the supervisor of any such township, upon the resolution of the common council of such city, or board of trustees of such village, or the township board of such township, for that purpose duly passed.

SEC. 2. Upon receipt of such sample the regents of the University of Michigan shall cause a correct analysis of such sample of water to be made and a correct statement of the properties contained therein, with a further statement whether or not such sample contains any substance deleterious to health, and return such analysis together with the statement aforesaid to the person so sending the same, free of charge except the actual cost of materials and animals used in making such analysis and experiments.

SEC. 3. It shall be the duty of the board of regents of the University of Michigan to cause a record to be kept of every sample of water received under and by virtue of this statute, and in no case shall a second analysis be required of the same water within one year except in case of the breaking out of some disease among the consumers of such water, and then only upon the certificate of at least two physicians engaged in active practice in that community that in their opinion such disease arises from the use of said water.

Approved March 26, 1897.

Outbreaks of Typhoid Fever Attributed to Defective Drainage or Sewerage, Filth or Unsanitary Conditions, Colds, Etc.

The following are a few extracts from reports of health officials, with the names and jurisdictions subjoined, relative to cases of typhoid fever attributed to defective drainage or sewerage, unsanitary conditions, etc.:

"I think from a defective sewer. Lady taken sick probably from sewer gas."—C. E. Knapp, M. D., *St. Johns village, Clinton county.*

"Patient lived alone, his surroundings were very filthy and in my opinion unhealthy. Patient was not away from home for over a month previous to being taken sick, so he must have contracted the disease from his surroundings."—Duncan Buchanan, health officer, *Sheridan township, Huron county.*

"Probably from unsanitary conditions around house."—George G. Barnett, M. D., *Ishpeming, Marquette county.*

Relative to the outbreak which is referred to in the last-mentioned quotation, the health officer, Dr. Barnett, wrote to the Secretary of this Board as follows:

"We have had an interesting outbreak of typhoid fever, in one family, numbering seven cases, with two deaths. They were all of the most malignant type, and the convalescence has been long and tedious. One of the nurses who took care of these seven children contracted the disease in the same malignant form, and her physician told me today that she will die. The cause must have been purely local; but we have not discovered it. None of the neighboring houses had typhoid patient, nor was the family in any way connected with typhoid patients."

"He had been acting as out-house cleaner at night in middle of the State and came home sick."—Arthur Toal, M. D., *Elk township, Sanilac county.*

"Inhalation of sewer gas."—Henry McCrea, M. D., *Marlette township, Sanilac county.*

Typhoid Fever in Lapeer City Attributed to Unsanitary Surroundings.

Relative to an outbreak of typhoid fever in Lapeer city, February 25, 1897, J. V. Frazier, M. D., health officer of the city, wrote to the Secretary of this Board as follows:

"In reference to the outbreak of typhoid here, I wish to ask your opinion as to the wisest course to pursue, under existing circumstances. The number of cases thus far has been limited to two, both in same family, and the cause of the outbreak I believe to be condition of the house in which they live. It is an old house rebuilt, no cellar, no drainage, no any-

thing. The water stands in pools all around in underneath it during open weather, and during the hot season it smells very bad. The history of the building shows typhoid to have existed there two years ago, and with conditions as I state, I consider the house a menace to the health of whoever lives in it, and also to the general health of that part of the city. What would you advise me to do about it and how can I move in order to abolish such a nuisance? I wish to know that I am right and then I can go ahead."

In reply to the last-quoted letter, March 1, 1897, the Secretary wrote to Dr. Frazier:

"Your letter of February 25, relative to typhoid fever, is before me, for which please accept thanks. Act 137, laws of 1883, empowers *you* to act in all cases of diseases dangerous to the public health. Relative to the source of contagium in typhoid fever, I herewith enclose a marked copy of the pamphlet bearing upon the restriction of typhoid fever.

"Relative to nuisances, the law empowers your local board of health to act in such cases, and I herewith enclose you a marked pamphlet bearing upon that subject. The enclosed pamphlet also contains a copy of act 137 above referred to."

Typhoid Fever in Sault Ste. Marie, not Reported by Attending Physicians.

Information of the existence of typhoid fever in Sault Ste. Marie having come to the knowledge of the Secretary of this Board, the usual notice and blank for final report were sent to B. D. Harrison, M. D., health officer of the city. In reply to said notice, Dr. Harrison, wrote to the Secretary as follows, under date of August 19, 1897:

"Your memo of the 17th inst. enclosing final report blank of typhoid fever received. We have cases of typhoid fever here (mild and more or less severe) some six months in the year—from June 1st to December 1st. Our local health laws do not compel placarding in cases of typhoid; and it is impossible to enforce the law regarding the reporting of mild cases. We have a few cases of mild typhoid here at present which have not been reported. While knowing it exists in a general way, I have no certain information which would furnish me the material for reporting it in weekly reports, and will not be able to put in a final report until next December. Then as regards sending in final reports of deaths from consumption. A certificate is filed with me giving the cause of death as consumption, I report this to you, and you send me a final report to make out, and in order to do so I must have an intimate knowledge of the case before and after death, whereas I know absolutely nothing concerning the case. I pass the blank on to the attending physician, and that is the last of it. I cannot compel him to report. If you do not always get reports from me you will know why."

In reply to Dr. Harrison's letter, August 24, 1897, the Secretary wrote:

"Your letter of August 19 relative to typhoid fever and consumption is before me, for which please accept thanks. Relative to typhoid fever, I think that you should enforce the law relative to householders and physicians reporting cases of typhoid fever, and require that all cases of that disease be reported to you in accordance with the law. I also think you should require consumption to be reported in the same way, as the law requires. You say that you know that typhoid fever exists in a general way, but have no certain information which would aid you in making weekly reports* and that you will not be able to put in a final report until next December. I presume that you refer to your annual report which is made at the close of the calendar year. While the annual report is required by law and is very essential, yet it does not contain the information which we wish to know relative to whether anything was done for the restriction and prevention of typhoid fever.

Replying to the last-quoted letter, August 31, 1897, Dr. Harrison again wrote to the Secretary as follows:

"Yours of the 24th inst. received relative to typhoid fever, and my compelling physicians to report all cases of the disease to me. As I have before written, we have a large number of very mild cases here from about August 1st to December 1st. Very often it is impossible to diagnose the disease typhoid until recovery is well along. In order to be sure of your diagnosis it requires time. No medical man is going to report a case of typhoid until he is sure of the diagnosis, and how are you going to compel him to do so? Where are you going to get the evidence? If you saw the case yourself you could not make a certain diagnosis in a visit or two. The law may be one thing, but it is another thing to convince a jury without evidence, or upon guess work; and any attempt to

* "Kindly examine Sec. 1, act 137, laws of 1883, on page 3 of the marked pamphlet sent to you by this mail. If you make the investigation required by law you will have the information for report and for action to restrict the typhoid fever.—H. B. E., Sec."

force things of this nature makes a fool of the whole thing. The local board does not require placarding in typhoid, and does not regard it in this city as a dangerous communicable disease. Consequently the act and Section do not apply, as in that act and Sec. 2 of same, 'In the absence of regulations conflicting therewith, made and published by the local board of health, * * * * this act shall have the force of regulations made,' etc. And again, Sec. 1. It shall be the duty of the health officer to do so and so 'unless he shall have been instructed' otherwise by the local board of health. We have had in the Sault five or six hundred cases of typhoid between August and December. How is it possible for one man at a hundred dollars a year to investigate, fumigate and report upon these cases? This year, owing to sanitary work done, we have two or three mild cases at the most, none that I know of by report to me. I do not know that even one case exists. I simply make a guess at the two or three cases. Last year at this time I had some fifty cases of typhoid. It would be fair to assume that there were some three hundred cases of typhoid here a year ago. The cases I reported sometime ago were estimated. You send me post cards to make out weekly, in which I am supposed to estimate diseases present. I estimated two cases of typhoid, and to be consistent I had to report them in the Infectious report. My partner remarked at the time, 'You are foolish to attempt to make any estimate. The two reports cannot be made consistently. They will immediately ask for reports on some of your estimated cases of typhoid or consumption, and then you will be up a tree.' It turned out just as he said. In future I shall avoid any estimate on infectious or contagious diseases. Where possible I shall make physicians report typhoid and consumption; and I think they should be reported, and also investigated thoroughly.

"What is your opinion of formaldehyde and formaldehyde lamps for disinfecting? Which lamp would you recommend?"

"The council is going to pass a plumbing ordinance and the board of health and health officer are to be the executive to carry out the plumbing ordinance. Can the board make rules and regulations and license plumbers under the authority of an ordinance? Can you give me any suggestions relating to same?"

September 3, 1897, the Secretary replied as follows to Dr. Harrison's letter of August 31, 1897:

"Your letter relative to typhoid fever and consumption is before me, for which please accept thanks. It seems to me that in a city no larger than the Soo having five or six hundred cases of typhoid fever between August and December, for the local board of health to pay no attention to the disease and not to regard it as a disease dangerous to the public health, is certainly a very weak and foolish position for the board to take, and one that is liable to cause severe criticism, and what is worse, unnecessary sickness. The local board of health should use every effort to restrict and prevent typhoid fever, as it is a disease that can be prevented if the proper precautions are used.

"Relative to your weekly card reports, I am surprised to know that you have continued reporting cases on the postal reports that did not come under your own personal observation, as I have tried to impress upon you that it was *actual cases* that was wanted, and not guess work. I trust that you will report only actual cases that come under your own personal observation on the weekly card-reports; and only actual cases of the dangerous communicable diseases on the weekly reports of such diseases.

"Relative to the plumbing ordinance, I am not in a position to know just what powers your charter conveys to the council, and therefore cannot answer your question."

Alleged Neglect to Report Typhoid Fever in Beaverton Village.

October 4, 1897, Frank S. Pierce, M. D., health officer of Beaverton village, Gladwin county, wrote to the Secretary of this Board as follows relative to the failure of physicians in his jurisdiction to report cases of typhoid fever which occurred in their practice:

"Persons come to me telling me there are cases of typhoid, and other contagious diseases pronounced so and treated by the other doctors here, but which are not reported to me. Have I not cause for action against these doctors if that is the case, and how should I proceed?"

In reply to Dr. Pierce's letter, the Secretary, October 7, 1897, wrote as follows:

"Your letter and weekly report are before me, for which please accept thanks. The law requires physicians and householders to report all cases of any disease dangerous to the public health directly to the health officer, and provides a penalty in case they fail to comply with the law. If the law is being violated in the village you should, and you are required by law to, report such violations directly to the prosecuting attorney, but if the violations are in the township, you should report such violations to the supervisor of the township, whose duty it is to prosecute, the prosecuting attorney to conduct the suit if so requested. Your report should be in writing and be explicit as to name, date, disease existing, etc.

"Relative to your weekly report on blank 'M.' you head the report 'Village and township.' Separate and distinct reports should be made for each jurisdiction when reporting dangerous communicable diseases on the blanks especially prepared for that purpose.

"Relative to weekly postal-card reports of sickness, they should be made without regard to your jurisdiction as health officer, and should include all cases of each disease named on the card, that may come under your own personal observation. If a dangerous communicable disease is reported on the postal-card report, you should indicate, on the margin, in what city, village or township, such dangerous disease is located."

Physicians in Shepherd Village Neglect to Report Typhoid and Typho-malarial Fevers.

November 8, 1897, W. J. Galerno, M. D., health officer of Shepherd village, Isabella county, reported to the Secretary of this Board that certain physicians neglected to report to the health officer cases of typhoid and typho-malarial fevers which occurred in their practice, and asked the Secretary to "send some literature" to said physicians, "with imperative orders to invariably report such cases to the local health officers."

In reply to Dr. Galerno's communication, November 9, 1897, the Secretary wrote:

"Your letter of November 8, relative to physicians not reporting dangerous communicable diseases, is before me. While this office is always ready and willing to assist the local health authorities in the enforcement of the public health laws, yet I do not feel like doing what is clearly the work of the local health authorities. The law says that all violations shall be reported by the health officers of cities and villages to the prosecuting attorney, whose duty it is to prosecute. If the law is being violated you should report the violations to the prosecuting attorney. I will mail a copy of the law to the physicians you name in your letter and I also enclose a marked copy herewith."

Alleged Neglect to Report Typhoid Fever in Wheatfield Township.

Relative to an outbreak of typhoid fever which occurred in Wheatfield township, Ingham county, the health officer of the township, wrote to this office as follows:

"These cases were not reported by the doctor or householder; and as they were in a distant part of the township I knew nothing about them until after the burial."

Neglect to Report Typhoid Fever in Ecorse Township.

Relative to a case of typhoid fever in Ecorse township, Wayne county, the health officer, Henry Belanger, M. D., reported to this office: "The girl died October 9, 1897, and I was informed of the case after her death."

Typhoid Fever in Niles City not Reported by Attending Physician.

The death of Bertha Redding, a resident of Niles city, from typhoid fever, was learned at this office through the bureau of Vital Statistics. The case not having been reported to this office demand for a report was sent to the local health officer, Dr. W. T. Dugan, who replied to said demand November 28, 1897, as follows:

"In answer to yours of the 26th inst. I can say that neither in my own practice, nor by inquiries, can I learn of any case of typhoid fever in Niles.

"I learn from neighbors of Bertha Redding that she was taken with malarial fever—was taken to a hospital,* no outsiders allowed to see her, and in two weeks was reported to have died with typhoid fever. From the reputation of the institution and from the care taken to keep all her friends from seeing her I am one who believes her death was from an abortion, although I knew of it too late—several days after the funeral—to either prove or disprove it. The case was never reported to me."

On receipt of Dr. Dougan's letter, the Secretary wrote as follows to Hon. George M. Valentine, prosecuting attorney of the county, relative to this subject:

"There is on file in the State Department a certificate of the death of Bertha Redding, female, age 36, who died Oct. 10, 1897, in the city of Niles, and the attending physician was William H. Smith, who certified as the cause of death 'typhoid fever.'"

"In accordance with the custom of this office, as soon as information of this death was received here, a demand was made upon the health officer of Niles for a report of that case. Doctor W. T. Dougan, health officer of Niles, reports that no case of typhoid fever* has been reported to him.

"Section 1676, Howell's Statutes, requires that whenever any physician shall know that any person whom he is called to visit is infected with any 'disease dangerous to the public health,' he shall immediately give notice thereof to the health officer. Inasmuch as Dr. William H. Smith certified that Bertha Redding died of typhoid fever,* he must have known that she had that disease, and as soon as he did know that, the law requires that he should report the case to the health officer. In this instance there seems to be positive and official evidence of disregard of law by Doctor Smith.

"In a letter written by you to Doctor Belknap of Niles, June 12, 1897, you say 'There can be no question, I think, that under Section 842 of Howell's Statutes it is the duty of the prosecuting attorney, generally to prosecute for violations of Section 1676 of Howell's Statutes, as amended by Act No. 158, session laws of 1895.'

"Typhoid fever is a 'disease dangerous to the public health'; it is a disease that ought to be restricted. This is not the first allged offense by Doctor W. H. Smith. It would seem important that the case be prosecuted.

"If it should turn out that the certificate of the cause of death was *false*, there ought to be some way for the prosecution in that case, because the accuracy of the vital statistics is a subject of considerable importance.

"Enclosed please find stamped envelope for your reply."

"P. S.—After this letter was written, the certified copy of the certificate of death has been received, and the certificate reads 'Typho-Malarial.' So far as relates to this office, or the view of the State Board of Health, this is the same as 'typhoid fever'; but it may be that a jury would not have the same enlightened view. Herewith I send you the State Department's certified copy of the certificate of death; also the circular leaflets on typhoid fever and typho-malarial, issued by this Board, also recent bulletin showing how the subject is now reported here. I shall be glad to hear from you on the subject."

December 2, 1897, the prosecuting attorney replied as follows to the Secretary's letter:

"Yours of November 29 was received in due course of mail but I have been too busy in the trial of criminal cases in the circuit court to even answer your letter until this moment. I will now investigate the matter as soon as possible and take such action as I think demanded by the law and facts. It may be several days before I can investigate it because there are other matters of a pressing nature now demanding my attention, but I assure you that I will investigate it as early as possible."

Milk the Suspected Cause of Typhoid Fever.

November 17, 1897, A. H. Rockwell, M. D., health officer of Kalamazoo city, wrote to the Secretary of this Board as follows, relative to the suspected spread of typhoid fever from contaminated milk:

"I have been investigating the milk supply in the cases of typhoid fever reported since Sept. 1 until Nov. 7. I could find nothing to indicate that any of the cases were caused by the milk used. Since Nov. 7, however, there have been eleven cases of typhoid fever reported, all of which were receiving their milk from the same source.

"Immediately on ascertaining the above facts I drove to the dairy farm from which the milk was produced and found the premises in a bad sanitary condition, especially the barn and yard. The well supplying water for general use was located on low ground and at the corner of the barn, within twenty to thirty feet from the cow stables and yard. The water had a very unwholesome appearance and upon examination by Dr. Crane was found to contain about thirteen times the amount of chlorides contained in the average Michigan water, besides multitudes of bacteria. It is undoubtedly contaminated by the drainage from the stables and barn-yard. The proprietor was required to discontinue the sale of milk until the sanitary conditions are improved, including a general renovating of the whole premises and a new well, which will be located at least 100 feet from the barn and yard. The proprietor seemed willing and anxious to follow any suggestions for the improvement of the sanitary conditions.

"I reported the facts to the city council at the meeting last Monday night, with the recommendation that an ordinance be adopted at the earliest possible date, providing for licensing the sale of milk in the city, the granting of license to be based upon an inspection of the dairies and milk in all cases.

"A resolution was adopted instructing the ordinance committee to report an ordinance covering the matter, at the next meeting of the council."

* Postscript to this letter changes this slightly.

November 19, 1897, the Secretary replied as follows to Dr. Rockwell's letter:

"Your letter of Nov. 17, relative to investigation of source of milk supply, in connection with the outbreak of typhoid fever, is before me, for which please accept cordial thanks. Your letter is interesting.

"Permit me to make the suggestion that 100 feet is rather a short distance for a well from possible contamination; 100 yards would be much more safe. However, I suppose it is quite improbable that the typhoid germ would be in the barn-yard unless it was deposited there by some person suffering with the disease. You don't say how far the well is and will be from the privy; that is an item well worth consideration."

Typhoid Possibly Contracted by Handling Rags.

Relative to the source of contagium in an outbreak of typhoid fever in Plymouth village, Wayne county, Dr. F. N. Dewey, health officer of the village, reported to this office: "Patient handled a large quantity of rags at Monroe a short time before he was taken sick and thinks he contracted the disease there."

This is quite possible, because as is now known, in a considerable proportion of cases of typhoid fever the urine of the patient contains large numbers of the germs of typhoid fever; and, as the germs are not all destroyed by partial or incomplete drying, it is quite possible for clothing or bedding used by a person sick with typhoid fever to spread the disease.

Typhoid Fever Contracted while Sailing on Lake St. Clair.

October 16, 1897, Fred Grover, M. D., health officer of Erin township, Macomb county, reporting to this office the occurrence of a case of typhoid fever in his jurisdiction, stated: "Nearly all the cases of typhoid fever in our township are sailors on sand scows sailing between St. Clair Flats and the entries of Mt. Clemens or Detroit. We have cases mostly every fall. Several years ago I advised caution and had them take water from the upper part of the lake in a barrel and since then we have had less fever; but nearly every fall some poor fellow suffers."

On his final report of this outbreak, Dr. Grover wrote: "Nearly every year I have one or more sailors with typhoid fever contracted on Lake St. Clair. I know of at least one case, contracted near Mackinaw City, sent to Marine City, finally sent to his home in Brighton, Mich. Carried on the boat, are the discharges of sick persons disinfected? If not may this not in part account for some of the typhoid in towns along the water course? This young man worked near where the large boats pass in lake, drinking water from same."

Typhoid Fever in Delhi Township Diagnosed as Bilious Fever.

Reports to this office show that typhoid fever appeared in a family in Delhi township, Ingham county, and the attending physician diagnosed the disease as bilious fever. The health officer of the township visited the patient and pronounced the disease typhoid fever. The disease spread to two other families, relatives of the first case, and the attending physician also contracted, and died of, the disease.

Typhoid Fever Attributed to Working among Diseased Peach Trees.

December 18, 1897, Samuel Galbreath, health officer of Casco township, Allegan county, wrote as follows to the Secretary of this Board relative to a case of typhoid fever which occurred in his jurisdiction:

"I have been absent from home about 6 weeks, have just returned. I write to report and inform you in regard to a case of typhoid fever which I reported to you just previous to my departure from home. On returning I find the patient well or nearly so. I have examined the premises, the water, the milk, the out buildings and find nothing filthy or unclean. The water supply is from a tubular well almost 100 feet deep, pumped with a wind-mill through galvanized iron pipe. This well is not within 100 feet of any out building or barn yard. The top of the pipe is capped over so it would be an impossibility for any impurities to get inside of the pipe. This water is also piped to the barn, and this water and no other is what the cows drink summer and winter. But this I learned, 4 years ago this man in the prime of life came down with typhoid fever. After the fever had its run he had a relapse and came very near dying and has not been a strong man since. He was appointed as Yellow's Commissioner to examine peach orchards infected with that disease. After about 14 days at this work he came down with the fever as reported. I am of opinion the disease was contracted while working among these diseased trees, he being in a condition to readily take the disease. There have been no other cases here. I didn't fumigate the home, as the family said they had done so during my absence. This is the only explanation I can give, as there have been no other cases for him to take it from."

The average period of incubation in typhoid fever is about eleven days, so that if the man had been traveling about for fourteen days he had opportunity to drink water from some infected well, even though the well at his own residence was free from infection.

Measures Taken to Restrict Typhoid Fever—Results.

In studying the effects of efforts of health officers for the restriction and prevention of typhoid fever, and of the difficulties experienced by some of them in carrying out the methods recommended by the State Board of Health to that end, it is interesting to note the difference in the reported numbers of cases of sickness and of deaths, from this disease, in outbreaks where local health officers were enabled to enforce isolation and disinfection, and in those outbreaks in which, for any reason, those restrictive measures were neglected.

In the compilation of the reports for Tables 7 and 8 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

TABLE 7.—Typhoid Fever in Michigan in 1897: Exhibiting the Numbers and Average Numbers of Cases and Deaths per Outbreak.*—
 (1) in all the 569 outbreaks reported; (2) in the 267 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 9 outbreaks in which Disinfection was doubtful; (4) in the 22 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 22 outbreaks in which Isolation was enforced and Disinfection was neglected; (6) in the 56 outbreaks in which Disinfection was enforced and Isolation was neglected; (7) in the 103 outbreaks in which both Isolation and Disinfection were neglected; (8) in the 90 outbreaks in which both Isolation and Disinfection were enforced.

(1) All outbreaks. (569 outbreaks.†)	(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (267 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (9 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (22 outbreaks.)		(5) Isolation enforced—Disinfection neglected. (22 outbreaks.)		(6) Disinfection enforced—Isolation neglected. (56 outbreaks.)		(7) Isolation and Disinfection both neglected. (103 outbreaks.)		(8) Isolation and Disinfection both enforced. (90 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals----	1,502	291	54	7	36	4	53	12	113	16	336	74	135	23
Averages	2.64	0.52	6.00	0.78	1.64	0.18	2.41	0.55	2.02	0.29	3.26	0.72	1.50	0.26

* *Definition of Outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended, unless new cases occur, the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of *years* require that outbreaks be counted as closed at the end of the *year*, while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

† These do not include the cases and deaths in Detroit and Grand Rapids because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease was present in some part of the city nearly all the time.

Isolation and Disinfection Restrict Typhoid fever.

Typhoid fever in Michigan in the 7 years, 1890-96:- Exhibiting the average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)

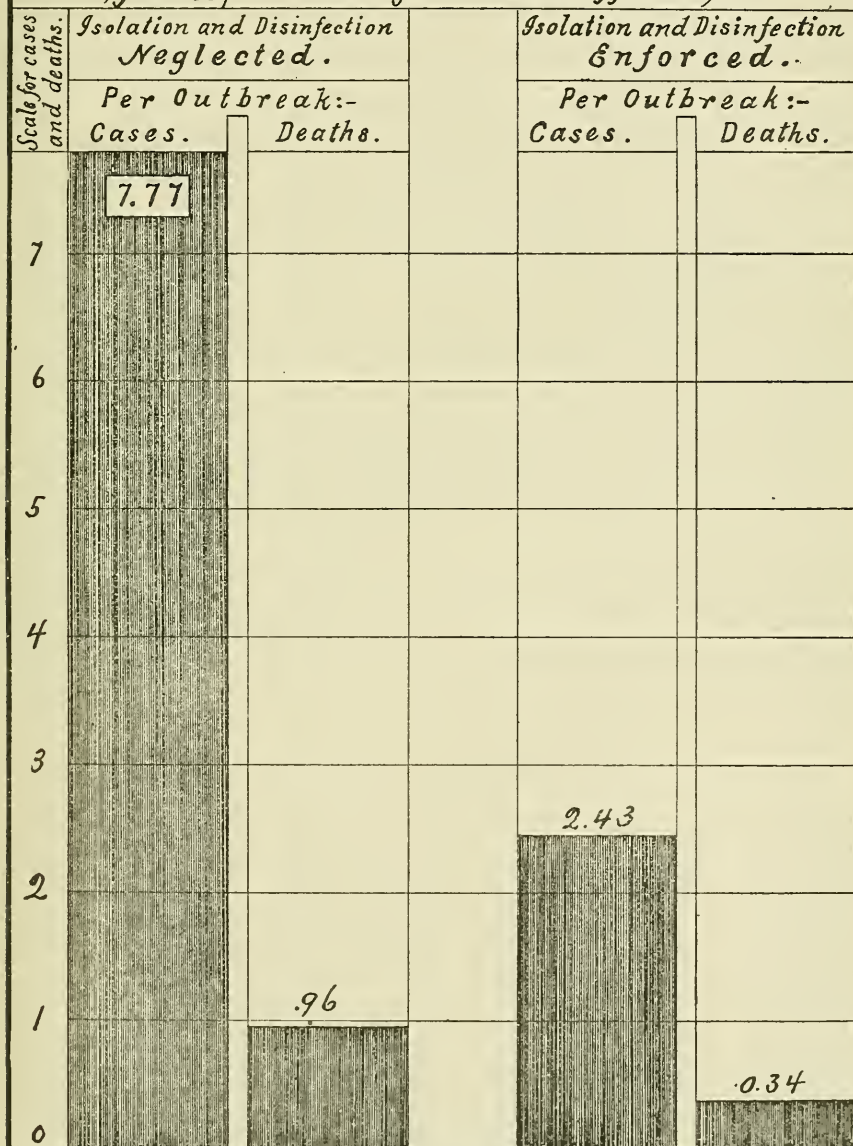


TABLE 8.—*Exhibiting, relative to Typhoid Fever, for the eight years, and for each of the eight years 1890-97, the numbers of Reported Outbreaks, Cases and Deaths; also for this eight-year Period, the average numbers of Cases and Deaths per Outbreak in all Outbreaks; in those Outbreaks in which Isolation and Disinfection were both Neglected; Isolation, and Disinfection both Enforced; and, also, the Numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

Years.	All Outbreaks.*				Isolation and Disinfection both Neglected.				Isolation and Disinfection both Enforced.				Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.			
	Cases.		Deaths.		Out-breaks.		Cases.		Deaths.		Out-breaks.		Cases.		Deaths.	
	Out-breaks.															
1890.....	330	1,924	304	53	349	51	38	75	12	247	13	7,538	497			
1891.....	541	4,018	607	56	1,196	114	31	54	9							
1892.....	524	2,195	416	41	183	38	35	65	9							
1893.....	539	2,255	405	47	240	25	33	54	8							
1894.....	596	2,537	405	61	282	32	47	132	15							
1895.....	792	3,453	524	137	917	138	85	294	41	1,845	276					
1896.....	629	2,236	329	98	666	77	105	233	32	2,041	168					
1897.....	569	1,502	294	103	336	74	90	135	23	353	116					
Totals.....	4,520	20,120	3,284	596	4,169	549	464	1,042	149		12,882	1,141				
Averages, eight years.....	565	2,515	411	75	521	69	58	130	19		1,610	143				
Average cases and deaths per outbreak for eight years.....					6.99	0.92		2.25	0.32							

* Outbreaks in Detroit and Grand Rapids are not included, owing to the difficulty in determining the beginning and ending of an outbreak in those localities.

The last four columns of Table 7 show that, according to the data in the office of the State Board of Health, the numbers of cases and deaths in outbreaks of typhoid fever relative to which restrictive measures were neglected, were more than twice as many as in outbreaks where restrictive measures were enforced.

Table 8 shows the numbers of cases of sickness and deaths from typhoid fever which have probably been prevented during the eight years 1890-97, by restrictive measures recommended by the State Board of Health.

Table 9 shows for the eleven years and for each of the eleven years 1887-97, the duration of sickness in fatal cases of typhoid fever in 1897, expressed by the per cent of the total number of deaths which occurred in each of certain specified periods of days.

The average duration of the 95 fatal cases of typhoid fever in males in 1897 of which the days of being taken sick and the days of death were reported, was 21.2 days; and of the 78 fatal cases in females it was 20.6 days. For both sexes the average was 20.9 days.

Table 10 gives information relative to non-fatal cases of typhoid fever similar to that given in Table 9 relative to fatal cases of the disease.

The average duration of non-fatal cases in males in 1897 was 32.0 days; in females it was 31.8 days and in both sexes it was 31.9 days.

In studying Tables 11, 12 and 13, relative to age of persons who died with or who had typhoid fever, it should be held in mind that there are more persons living in the earlier ages than at the more advanced ages. In the last three lines of Table 13, and in the diagram "Age Distribution," etc., Plate 942, this fact is taken account of, and the diagram graphically exhibits the relative danger of death at each period of life, according to the experience in Michigan in the six years 1891-96, and it is approximately the same for the year 1897.

By Table 13 it may be seen, that to males the greater danger of death from typhoid fever was in the age-periods 15 to 30 years, especially in the period 20 to 25 years; the greatest death-rate of females was during the age-period 15 to 20 years.

The average age at death of all persons, both males and females, was 26 years.

*Average Duration of Typhoid Fever.—Fatal and Non-Fatal Cases.*TABLE 9.—*Exhibiting by sex of patient, the average duration (in days) of fatal cases of sickness from Typhoid Fever in Michigan, during the eleven years, and each of the eleven years, 1887-1897. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Typhoid Fever.														
Year.	Sex.	No. of cases in- cluded.	Duration of Sickness:—Per cent of Deaths in each Period of Days.											
			All cases.	Un- der 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1887.	Males	81	100	10	7	15	21	16	11	12	2	4	1	0
	Females	32	100	31	19	19	16	6	3	0	0	6	0	0
1888.	Males	40	100	20	13	18	23	10	8	0	5	3	3	0
	Females	33	100	24	21	15	12	9	6	3	0	0	9	0
1889.	Males	42	100	17	14	19	7	14	5	7	2	7	0	7
	Females	51	100	18	24	14	16	10	2	6	2	2	0	8
1890.	Males	57	100	19	9	21	23	5	5	7	0	4	2	5
	Females	26	100	19	23	8	8	19	12	0	8	0	0	4
1891.	Males	80	100	14	20	18	23	10	6	5	1	1	0	3
	Females	56	100	20	23	20	11	9	2	5	5	0	0	5
1892.	Males	92	100	23	21	14	13	14	4	3	3	-----	2	2
	Females	60	100	23	18	15	15	7	10	5	5	-----	2	-----
1893.	Males	94	100	24	15	11	13	11	4	5	3	4	4	5
	Females	84	100	25	30	7	13	7	7	6	7	1	0	1
1894.	Males	89	100	22	17	17	11	13	3	2	5	3	0	7
	Females	80	100	27	22	11	8	10	4	3	8	1	4	3
1895.	Males	150	100	19	17	15	17	7	9	4	3	3	2	4
	Females	107	100	24	22	15	8	7	7	7	4	3	1	2
1896.	Males	88	100	30	17	17	15	6	5	3	3	1	0	3
	Females	73	100	23	23	16	8	10	8	4	3	1	0	3
1897.	Males	95	100	23	19	19	11	9	6	1	5	0	2	4
	Females	78	100	27	18	18	10	12	4	3	4	1	1	3
A v. 1887- 1897.	Males	83	100	20	15	17	16	10	6	4	3	3	1	4
	Females	62	100	24	22	14	11	10	6	4	4	1	2	3

TABLE 10.—*Exhibiting, by Sex of patient, by per cent of cases which recovered in specified periods of time, the Average Duration (in days) of Non-Fatal cases of sickness from Typhoid Fever, in Michigan, during the eleven years, and each of the eleven years, 1887-97. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Typhoid Fever.														
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Cases in each Period of Days.											
			All Periods.	Under 11 days.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1887.	Males.....	203	100	0	5	6	12	16	18	15	9	6	3	8
	Females.....	158	100	0	9	9	19	12	17	11	6	4	3	9
1888	Males.....	164	100	1	4	13	9	13	15	9	10	9	9	7
	Females.....	111	100	0	2	7	14	15	15	19	4	8	10	8
1889.	Males.....	166	100	2	7	13	14	16	14	12	9	6	2	5
	Females.....	165	100	6	8	9	14	19	12	11	8	2	2	7
1890.	Males.....	226	100	1	4	7	15	18	19	12	10	5	2	8
	Females.....	110	100	.....	4	14	16	17	13	14	9	2	5	6
1891.	Males.....	463	100	3	5	7	16	19	9	11	11	6	3	11
	Females.....	276	100	2	4	9	14	15	10	14	10	4	5	12
1892.	Males.....	329	100	2	4	5	16	22	12	12	11	5	2	9
	Females.....	177	100	2	5	8	15	14	14	9	8	8	4	14
1893.	Males.....	410	100	2	5	10	17	18	14	10	9	5	3	7
	Females.....	341	100	2	5	8	17	15	15	14	9	2	4	9
1894.	Males.....	453	100	2	6	7	14	15	16	13	7	6	3	10
	Females.....	340	100	2	5	9	14	18	17	11	7	5	4	8
1895.	Males.....	785	100	2	7	7	16	18	13	11	7	6	4	9
	Females.....	560	100	2	6	8	18	17	14	9	7	6	4	8
1896.	Males.....	500	100	1	6	10	15	18	12	11	8	5	3	11
	Females.....	382	100	2	6	11	14	19	14	12	8	3	3	9
1897.	Males.....	382	100	4	8	8	12	23	13	9	7	5	3	8
	Females.....	313	100	5	8	7	13	22	13	13	5	5	3	6
A.V. 1887-97.	Males.....	371	100	2	6	8	11	18	14	11	9	6	3	8
	Females.....	267	100	2	6	9	15	17	14	12	7	4	4	9

*Age of Occurrence of Typhoid Fever.*TABLE 11.—*Exhibiting by Sex, the per cent of persons in certain Age-groups sick from Typhoid Fever, in Michigan during the eleven years, and each of the eleven years, 1887-97; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of persons sick. Years.	No. of cases included.	Age.—In Periods of Years. Per cent of Cases in each Period of age.											
				All Ages.	Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 Years and over.	
1887.	Males.....	24	316	100	10	10	14	20	17	9	8	4	2	4	
	Females.....	22	245	100	17	10	20	15	10	10	5	4	3	5	
1888.	Males.....	24	310	100	12	13	15	20	11	11	5	4	3	6	
	Females.....	23	199	100	12	22	20	14	8	5	4	6	3	7	
1889.	Males.....	24	362	100	13	11	17	25	10	8	6	3	2	6	
	Females.....	23	310	100	16	17	20	12	8	7	7	4	4	5	
1890.	Males.....	22	325	100	14	12	16	25	16	7	4	3	2	3	
	Females.....	20	199	100	16	16	24	17	11	6	5	1	2	4	
1891.	Males.....	23	893	100	11	11	16	26	17	8	4	2	2	3	
	Females.....	23	553	100	13	20	21	15	10	6	3	3	3	5	
1892.	Males.....	23	*711	100	15	9	17	21	16	7	6	3	2	4	
	Females.....	20	*506	100	22	16	22	13	8	6	4	4	2	2	
1893.	Males.....	22	1,073	100	20	10	14	20	18	8	5	2	2	2	
	Females.....	17	894	100	21	16	19	16	11	5	3	2	3	4	
1894.	Males.....	23	813	100	21	12	13	17	13	7	9	3	2	3	
	Females.....	22	649	100	22	15	18	11	11	7	5	3	3	4	
1895.	Males.....	22	1,292	100	16	14	13	17	12	9	7	4	3	5	
	Females.....	21	991	100	19	20	17	12	8	7	5	5	2	5	
1896.	Males.....	22	835	100	17	15	14	17	10	9	7	3	3	4	
	Females.....	22	666	100	16	17	19	14	11	7	5	4	2	5	
1897.	Males.....	22	516	100	17	14	14	18	10	8	9	4	3	4	
	Females.....	20	390	100	23	16	18	13	8	7	6	4	1	4	
A.V. 1887-97.	Males.....	23	677	100	15	12	15	21	14	8	6	3	2	4	
	Females.....	21	509	100	18	17	20	14	9	7	5	4	3	5	

* In the Annual Report for 1893, the figures given for 1892, in Table 11 (Table 12 in this Report) include only the non-fatal cases of which the age and sex were given; whereas in the reports for 1894-96 all cases, both fatal and non-fatal, are included for 1892, as well as for all the other years treated.

TABLE 13.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who died of Typhoid Fever during each of the years 1892-97, also the per cent the deaths in each group were of all the deaths from Typhoid Fever.*

Year.	Sex.	Average age of decedents. Years.	No. of deaths included.	Per cent of Deaths in certain Age-groups.*										
				All Ages.	Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 years and over.
1892.	Males.....	28	116	100	3	6	18	22	22	8	4	5	3	8
	Females..	21	68	100	18	12	31	9	12	7	3	4	1	3
1893.	Males.....	28	121	100	7	5	11	24	23	13	7	2	2	5
	Females..	23	101	100	13	17	27	11	14	6	3	3	1	6
1894.	Males.....	26	113	100	15	11	8	20	13	11	9	5	3	5
	Females..	27	97	100	11	9	22	9	14	8	6	7	0	14
1895.	Males.....	28	176	100	9	8	14	16	12	11	7	6	5	12
	Females..	23	124	100	14	15	17	19	11	4	7	5	4	4
1896.	Males.....	26	132	100	7	11	18	21	10	10	11	3	3	7
	Females..	25	101	100	8	10	29	12	10	10	10	3	2	7
1897.	Males.....	27	130	100	12	5	15	21	15	5	8	4	3	12
	Females..	29	114	100	6	21	11	11	7	8	10	6	3	18
1892-97.	Percent the deaths in each age-group were of all the deaths		1,393	100	9	10	16	17	13	9	7	5		9

* In each age-group both years are included.

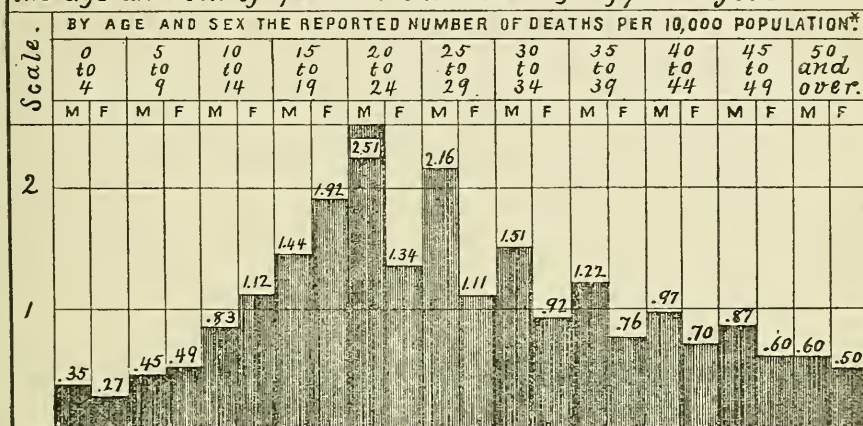
TABLE 13.—*Exhibiting by sex, the number of persons in certain Age-groups who died of Typhoid Fever during each of the six years 1892-97; also by Age-groups, the average number of deaths in the six years, 1892-97, per 10,000 inhabitants.*

Year.	Sex.	Average age of decedents. Years.	No. of deaths included.	Number of Deaths in certain Age-groups.*									
				Under 10 Years.	10 to 14.	15 to 19	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 Years and over
1892.	Males.....	28	116	4	7	21	26	25	9	5	6	4	9
	Females..	21	68	12	8	21	6	8	5	2	3	1	2
1893.	Males.....	28	121	8	6	13	29	28	16	9	3	3	6
	Females..	23	101	13	17	27	11	14	6	3	3	1	6
1894.	Males.....	26	113	17	12	9	23	15	12	10	6	3	6
	Females..	27	97	11	9	21	9	13	8	6	7	0	13
1895.	Males.....	28	176	16	14	25	28	21	19	13	11	8	21
	Females..	23	124	17	19	21	23	14	5	9	6	5	5
1896.	Males.....	26	132	9	14	24	28	13	13	14	4	4	9
	Females..	25	101	8	10	29	12	10	10	10	3	2	7
1897.	Males.....	27	130	16	6	20	27	20	7	10	5	4	15
	Females..	29	114	7	24	12	13	8	9	11	7	3	20
1892-97.	Males.....	{Deaths per 10,000 inhabitants of the same sex, and age, in each age-group.		.44	.84	1.67	2.56	2.10	1.41	1.23	.85	.68	.63
	Females..		.44	1.27	1.96	1.18	1.22	.89	.95	.83	.40	.58	
1892-97.	The average number of deaths (both sexes) per 10,000 inhabitants in each age-group for the six years, 1892-97.....			.44	1.06	1.82	1.87	1.66	1.15	1.09	.84	.54	.61

* In each age-group both years are included.

DEATH-RATES, BY AGE-PERIODS, FROM TYPHOID FEVER.

Diagram .— Exhibiting, by Age and Sex, the Average Annual number of reported deaths from Typhoid fever per 10,000 persons living in Michigan during the six years, 1891-96. Compiled from all reports to the Secretary of the State Board of Health, for the years mentioned, which stated the age and sex of persons who died of Typhoid fever.*



* Of corresponding sex and age.

[PLATE 942.]

Two Lines of Evidence of the Prevalence of Typhoid Fever.

In studying the prevalence of typhoid fever in 1897, from the facts presented in the preceding and following pages, it must be borne in mind that those facts are derived from two distinct sources of information:

1.—The numbers of outbreaks, of cases of sickness, and of deaths from typhoid fever are taken from special reports from health officers and other township, city and village officers, during the course of an outbreak, at its close, or in annual reports at the close of the year. If all the people and officers reported as the law provides, the facts presented would represent the *actual numbers* of outbreaks, cases of sickness, and deaths from typhoid fever which occurred in the State during the year; but *all* do not so report. It is just, however, to state that as the people generally are becoming better instructed in the measures recommended by the State Board of Health for the saving of life and health, better and more complete reports are made year by year. So, each year, we believe that an increasing proportion of the cases of sickness and deaths from the dangerous communicable diseases are reported to this office. This tends toward an apparent increase in the prevalence of the disease each year, modified, of course, by the real fluctuation in prevalence. While waiting for perfect reports, the facts derived from those now received are valuable for purposes of study.

2.—The prevalence of typhoid fever, or any given disease, as indicated by the "per cent of reports" is taken from the weekly postal-card reports

from regular correspondents of the State Board, health officers of cities and villages, and others. The "per cent of reports" is the per cent of the whole number of reports received which stated the presence of the disease named; it gives the relative prevalence of the disease, under the observation of the physicians who report. It may represent the relative area of prevalence of the disease, combined with the relative number of weeks the disease continued where it did occur, *but not the number of cases.*

The weekly card-reports, however, furnish a valuable means of ascertaining, approximately, the relative prevalence of the several diseases in a given year, and the relative prevalence of a given disease in one year compared with other years, and it is as good a scheme for ascertaining the facts as is yet available. Therefore the sickness statistics based upon those weekly card-reports should be relied upon for a comparison of the relative prevalence of typhoid fever in 1897, compared with preceding years. However, the evidence from the two sources may well be compared.

A comparison of the evidence from the two sources just mentioned, relative to typhoid fever during the years, 1885-1897, is facilitated by Table 14.

TABLE 14.—*By years for the thirteen years 1885-97, and an average for the eleven years 1886-96, the per cent of reports (from regular correspondents to the State Board of Health, and others) stating the presence of Typhoid Fever in Michigan; also, for the same years and period of years, the number of outbreaks, number of localities of outbreaks, the cases of sickness and the deaths reported from Typhoid Fever.*

Years.	Per cent of weekly postal reports stating the presence of typhoid fever.	Reported outbreaks of typhoid fever.	Reported localities of outbreaks of typhoid fever.	Reported cases of sickness from typhoid fever.	Reported deaths from typhoid fever.
1885.....	8	218	200	715	194
1886.....	8	290	282	1,194	282
1887.....	10	335	320	2,424	411
1888.....	10	316	296	1,511	310
1889.....	10	432	398	2,530	402
1890.....	8	330	310	1,924	304
1891.....	11	543	501	4,670	697
1892.....	9	527	484	2,591	538
1893.....	9	545	504	3,512	594
1894.....	11	600	530	2,805	506
1895.....	13	800	695	3,751	621
1896.....	10	642	548	2,506	409
1897.....	7	584	500	1,900	352
Average 11 Years, 1886-96.	10	487	442	2,674	461

Typhoid Fever and Low Water in Wells.

Table 15 exhibits the relation of low water in wells to sickness (as shown by the weekly card-reports) and the reported deaths from typhoid

fever in Michigan, for the nineteen years, 1878, 1880-97.* The facts similar to those presented in two lines of this table, low water in wells and sickness from typhoid fever, for a ten-year period, are graphically represented in a diagram on page 256 of the Annual Report of this Board for 1889.

The diagram, Plate 681, on a subsequent page of this report, graphically represents the relation of the sickness from typhoid fever, according to the sickness statistics, to the rise and fall of the water in wells, in Michigan for the fourteen-year period comprising the years 1878 and 1880-92.

Table 18 exhibits the average prevalence of typhoid fever in Michigan by year and months for the ten years, 1878-87, and for each of the thirteen years, 1885-97, as indicated by the weekly card-reports made by regular observers. Table 19 exhibits the rainfall by months and years for the period of ten years, 1878-87, and for each of the thirteen years, 1885-97.

A study of this subject was made by the Secretary of this Board in a paper read before the American Public Health Association, at St. Louis, Mo., Oct. 16, 1884, which was printed in the Annual Report of this Board for the year 1884, pp. 89-114, and the study was continued subsequently, in the Annual Reports of this Board for the years 1888, pp. lv-lviii; 1889, pp. 254-262; 1890, pp. 247-251.

The evidence is conclusive that there is a necessary relation between the low water in wells and sickness from typhoid fever.

Exhibit 2.—Shows by years for the twenty-one years, and each of the twenty-one years, 1877-97, the per cent of all sickness postal-card reports received at this office from observers in different parts of the State on which typhoid fever and typho-malarial fever were reported present.

* See foot-note ([]) to Table 15.

EXHIBIT 2.—*Showing, by years, the Annual Average Per Cent of Card Reports which stated the presence of Typhoid Fever and Typho-Malarial Fever in Michigan, in the 21 years, 1877-97; also an average for each disease for the 21 years.*

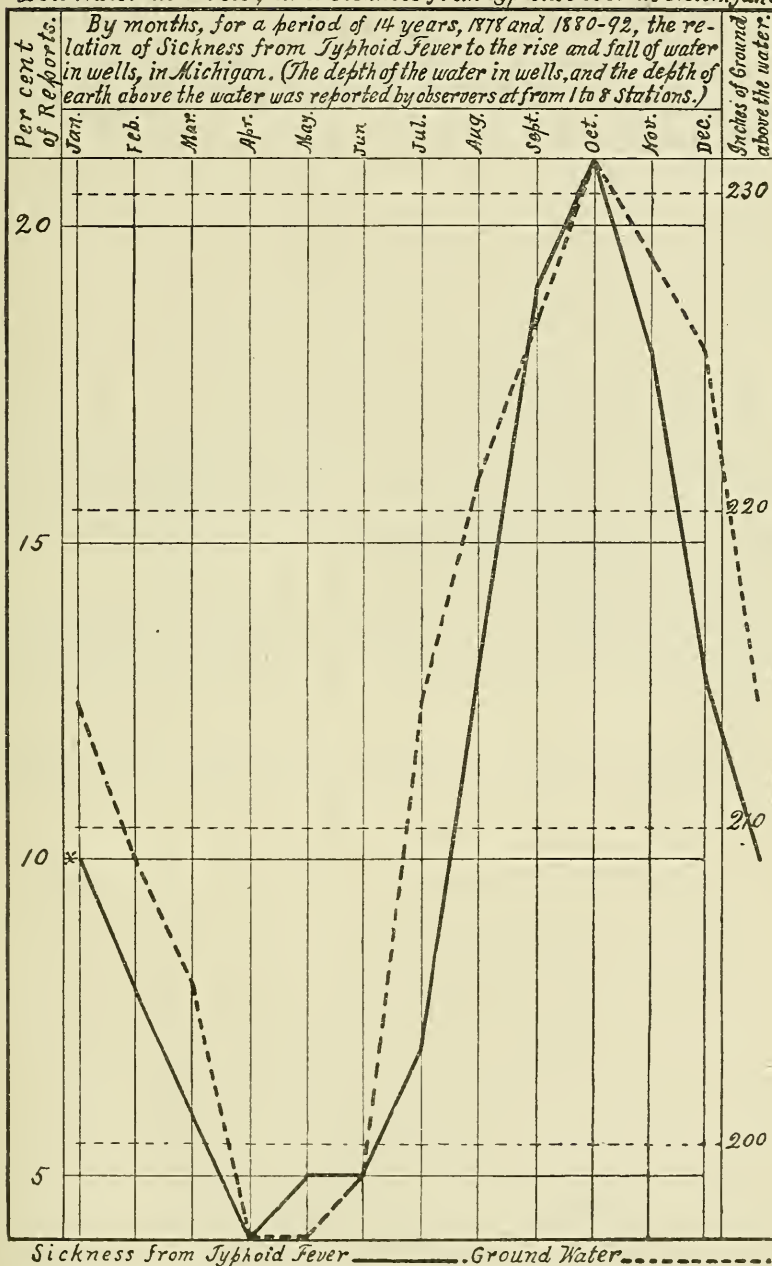
Year.	Per cent of reports stating presence of typhoid fever.	Per cent of reports stating presence of typho-malarial fever.
1877.....	14	26
1878.....	10	24
1879.....		22
1880.....	14	24
1881.....	18	29
1882.....	14	24
1883.....	11	18
1884.....	12	20
1885.....	8	16
1886.....	8	16
1887.....	10	16
1888.....	10	15
1889*.....	10	16
1890*.....	8	7
1891.....	11	6
1892.....	9	5
1893.....	9	4
1894.....	11	4
1895.....	13	4
1896.....	10	2
1897.....	7	0.9
Average for 21 years, 1877-97.....	11	14

* As tending to explain the change which occurred in 1890,—October 8, 1889, the State Board of Health passed two resolutions, as follows:

Resolved, That in the opinion of this Board all cases of so-called "typho-malarial fever" should be reported to the local health officer and the same precautions taken as in cases of typhoid fever.

Resolved, That all cases of fever of doubtful origin continuing more than seven days should be reported to the health officer, and precautions taken as in other diseases dangerous to the public health, such as typhoid fever.

Low Water in Wells, and Sickness from Typhoid Fever in Michigan



* Indicating what per cent of all reports received stated the presence of Typhoid Fever then under the observation of the physicians reporting. The danger from typhoid fever is greatest in October, when the water in wells is lowest, and least in April, when the water in wells is highest.

TABLE 15.—*Exhibiting, for Michigan, by Months, during the nineteen years, 1878, 1880-97,* the relation of low water in wells to sickness from Typhoid Fever; also, the reported number of deaths from Typhoid Fever.*

Conditions.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. inches of ground above the water in well† -----	240	234	231	219	222	227	240	243	248	251	250	246
Fluctuation from Maximum Depth of water in well‡ -----	21	15	12	-----	3	8	21	24	29	32	31	27
Sickness from Typhoid Fever§ -----	9	7	5	4	4	5	7	14	19	21	18	12
Av. number of reported deaths from Typhoid Fever|| -----	26	23	26	27	25	24	29	59	93	106	77	54

* The data relating to the sickness and the deaths from typhoid fever in the years 1878, 1880-97, were used in order to coincide with the same period for which the measurements of ground above the water in wells were already obtained.

† The year 1879 could not be included as, for that year, there was no station from which reports were received for the whole year. The stations used in the compilation of this line, and the years for which reports were received and compiled from each are as follows: Elsie, 1878; Thornville, 1880-1 and 1885-7; Hillsdale, 1880, 1884, 1887-90, 1892-96; Mendon and Union City, 1880; Linden and Dearborn, 1881; Brockway Center, 1882 and 1883; Otisville and Woodland, 1882; Saginaw City, 1883; Kalamazoo, 1884, 1888 and 1889; Lansing, S. B. of H., 1885-97; Ann Arbor, 1886-95 and 1897; Alpena, 1887-88; Otsego, 1887; Traverse City, 1888-93, 1895; Battle Creek, 1888, 1893-95; River Raisin, 1886-91, 1893-95.

‡ The Av. "Max. Depth" was in April, because the "Av. inches of earth above the water," was least in that month.

§ Per cent of weekly reports, from observers in different parts of the State, which stated the presence of typhoid fever.

|| The data used in the compilation of this line were taken from the Registration Reports of Michigan.—Vital Statistics. No correction has been made for unequal lengths of months. The deaths for 1897, being unobtainable, average eighteen years, 1878, 1880-96 is used in this line.

TABLE 16.—HEIGHT OF GROUND WATER.—*Inches of Earth above the Water—by Months for the thirteen years, 1885-97, and for the last four months of the year 1884, and for each of the thirteen years, 1885-97; also averages for the eleven years, 1886-96, at Lansing, Mich.,—Well in the Capitol Grounds.*

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1885-96	299	301	301	300	297	296	294	296	297	299	301	303	303
1884										290	291	293	292
1885	284	288	289	292	280	281	279	282	283	282	285	281	280
1886	281	276	278	274	272	273	277	282	287	287	286	291	294
1887	290	296	287	280	282	285	288	290	291	291	294	297	294
1888	294	292	298	294	293	293	293	293	290	293	297	294	300
1889	304	298	304	304	302	304	299	299	302	305	308	311	312
1890	300	309	307	305	302	296	292	293	295	300	300	298	300
1891	301	302	305	301	295	294	296	297	300	300	304	306	306
1892	301	308	307	306	305	300	295	293	293	296	300	304	305
1893	295	309	305	304	289	291	284	285	288	293	296	299	292
1894	298	294	293	296	296	294	287	292	296	300	305	313	312
1895*	322	316	319	320	319	322	324	324	324	324	324	324	324
1896†	319	324	324	321	321	321	319	320	319	317	316	313	313
1897	306	311	311	309	306	302	301	303	300	304	308	310	310
Av. eleven years, 1886-96	300	302	302	300	298	298	296	296	299	301	303	305	305

* In 1895, from June to December, the well at Lansing was dry, with the exception of the latter part of December, after the regular time for the observation was past.

† In 1896, during the months of January and February, the well at Lansing was dry.

TABLE 17.—*Exhibiting the number of Inches of Earth above the ground water in Lansing, by months, for each of the eleven years 1887-97, compared with the per cent of reported cases and outbreaks of Typhoid Fever in Michigan, for each month; also the total numbers of cases and outbreaks reported for those years. (Compiled from those cases of occurrence was given; and for those outbreaks of which the time of beginning was stated.)*

Specifications relative to Ground Water and Typhoid Fever.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	No. of cases and outbreaks included in this table.
Inches of earth above the water, year 1887.	206	287	280	282	285	288	290	290	291	291	294	297	294	1,006
Per cent of cases of typhoid fever reported, year 1887.	100	2	1	1	1	2	3	8	20	24	19	12	7	7
Per cent of outbreaks which began in each month, 1887.	100	5	2	2	3	6	4	12	23	20	11	9	3	289
Inches of earth above the water, year 1888.	292	298	294	293	293	293	293	293	290	293	297	294	300	609
Per cent of cases of typhoid fever reported, year 1888.	100	5	3	2	3	3	4	7	13	18	23	11	9	9
Per cent of outbreaks which began in each month, 1888.	100	7	5	3	3	4	6	12	15	16	15	6	7	265
Inches of earth above the water, year 1889.	298	304	304	302	304	299	299	299	302	305	308	311	312	1,248
Per cent of cases of typhoid fever reported, year 1889.	100	1	2	1	2	1	2	4	12	28	24	15	7	7
Per cent of outbreaks which began in each month, 1889.	100	4	2	3	3	2	5	8	17	21	19	11	6	382
Inches of earth above the water, year 1890.	309	307	305	302	296	292	293	293	295	300	300	298	300	1,089
Per cent of cases of typhoid fever reported, year 1890.	100	5	2	2	3	2	2	7	23	18	17	12	6	6
Per cent of outbreaks which began in each month, 1890.	100	5	4	3	3	6	5	9	25	13	15	6	5	253
Inches of earth above the water, year 1891.	302	305	301	295	294	296	296	297	300	300	304	306	306	1,464
Per cent of cases of typhoid fever reported, year 1891.	100	6	2	1	2	2	5	5	14	24	23	13	6	6
Per cent of outbreaks which began in each month, 1891.	100	6	3	2	3	4	5	8	20	18	19	9	4	454
Inches of earth above the water, year 1892.	308	307	306	305	300	295	293	293	293	296	300	304	305	2,482
Per cent of cases of typhoid fever reported, year 1892.	100	5	4	5	5	3	4	5	8	17	22	13	9	9
Per cent of outbreaks which began in each month, 1892.	100	10	3	3	3	4	5	8	16	16	15	7	9	462
Inches of earth above the water, year 1893.	309	305	304	298	291	284	285	285	288	293	296	299	292	2,237
Per cent of cases of typhoid fever reported, year 1893.	100	2	2	3	2	5	8	7	15	18	15	10	6	6
Per cent of outbreaks which began in each month, 1893.	100	8	3	3	3	3	8	7	16	20	15	8	5	469
Inches of earth above the water, year 1894.	294	293	296	296	294	287	292	292	296	300	305	313	312	2,806
Per cent of cases of typhoid fever reported, year 1894.	100	4	3	2	2	3	4	4	9	19	20	18	8	8
Per cent of outbreaks which began in each month, 1894.	100	7	3	2	5	4	6	8	19	17	17	9	4	527
Inches of earth above the water, year 1895.	216	319	320	319	322	324	324	324	324	324	324	324	324	3,551
Per cent of cases of typhoid fever reported, year 1895.	100	3	3	2	2	3	3	5	12	22	33	20	14	14
Per cent of outbreaks which began in each month, 1895.	100	5	3	2	3	2	4	9	19	21	21	7	4	3,716
Inches of earth above the water, year 1896.	324	324	321	321	321	319	320	320	319	317	316	313	313	3,417
Per cent of cases of typhoid fever reported, year 1896.	100	4	4	3	5	2	4	4	14	18	18	11	7	7
Per cent of outbreaks which began in each month, 1896.	100	8	4	3	5	4	8	13	18	18	16	5	4	573
Inches of earth above the water, year 1897.	311	311	309	306	302	301	303	303	300	300	308	310	310	1,586
Per cent of cases of typhoid fever reported, year 1897.	100	5	3	3	3	3	3	6	14	19	21	17	8	8
Per cent of outbreaks which began in each month, 1897.	100	5	3	3	3	4	4	6	14	20	21	12	5	517

TABLE 18.—TYPHOID FEVER IN MICHIGAN.—Average per cent of weekly card-reports stating the presence of Typhoid Fever by Year and Months, for ten years, 1878-87, and in each of the thirteen years, 1885-97; also, the average for the eleven years, 1886-96.

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 yrs., 1878-87*	12	10	9	7	5	5	5	7	14	20	22	20	14
1885.....	+ 8	11	7	5	4	3	5	5	6	11	13	16	8
1886.....	+ 8	6	3	4	3	5	4	5	13	16	16	13	10
1887*.....	10	6	10	4	3	3	4	8	14	22	18	15	11
1888.....	10	10	7	6	5	4	5	7	12	18	16	12	10
1889.....	10	8	5	3	3	4	5	5	12	19	25	19	12
1890.....	8	6	1	2	2	2	5	6	15	15	16	13	7
1891.....	11	5	5	2	2	3	3	6	12	21	27	21	15
1892.....	9	7	5	4	4	3	4	5	13	16	17	11	12
1893.....	9	6	4	3	3	4	6	7	12	16	23	20	8
1894.....	11	7	5	4	2	6	5	7	15	23	24	17	13
1895.....	13	8	5	5	8	3	3	13	19	23	31	24	14
1896.....	10	10	10	3	3	3	6	9	16	24	17	11	4
1897.....	7	3	5	3	1	3	5	4	12	10	14	12	7
Av. 11 yrs., 1886-96...	10	7	5	4	3	4	5	7	14	19	21	16	11

* † These foot-notes are on the bottom of page 261.

TABLE 19.—RAINFALL IN MICHIGAN.—Average number of Inches, by Months, for the ten years, 1878-87, and in each of the thirteen years, 1885-97; also averages for the eleven years, 1886-96.

Period of time.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Av. 10 yrs., 1878-87...	37.27	2.09	2.89	2.28	2.49	3.52	4.24	3.44	3.21	3.72	3.45	2.98	2.69
1885.....	35.82	2.70	.73	.58	2.47	2.30	6.01	2.52	5.82	3.75	3.08	2.90	2.14
1886.....	32.16	3.05	1.72	2.74	2.40	2.58	2.29	1.36	4.21	5.36	1.97	2.35	2.13
1887.....	29.81	2.57	4.40	1.08	1.69	2.35	2.62	2.51	1.86	3.12	2.69	2.00	2.92
1888.....	29.57	1.99	1.77	2.51	2.15	3.73	2.87	2.02	2.38	2.66	2.68	2.92	1.89
1889.....	28.18	2.42	2.04	1.01	1.62	4.21	3.82	3.07	.98	1.85	1.10	3.10	2.96
1890.....	36.25	3.53	2.40	2.12	3.37	4.80	3.74	1.47	3.63	2.09	4.97	2.43	1.70
1891.....	31.66	1.91	3.13	2.74	2.03	1.33	2.53	2.55	4.41	1.92	1.71	4.86	2.54
1892.....	33.09	1.95	2.16	1.39	2.16	5.45	5.17	2.39	2.92	3.01	1.40	3.14	1.95
1893.....	36.35	2.34	2.78	2.40	4.77	2.91	3.55	2.83	1.22	2.52	4.24	3.05	3.74
1894.....	28.74	1.77	1.66	2.09	2.46	6.52	2.76	1.30	.72	3.13	2.76	2.02	1.55
1895.....	27.06	2.95	0.72	0.97	1.51	3.04	1.34	1.47	3.23	2.53	1.18	3.48	4.65
1896.....	32.65	1.61	1.34	1.29	2.91	3.14	3.13	4.25	3.95	4.92	1.80	3.38	0.92
1897.....	32.15	3.64	1.28	3.04	2.72	3.74	2.50	3.63	2.44	1.13	2.39	3.32	2.33
Av. 11 yrs., 1886-96...	31.41	2.37	2.19	1.85	2.46	3.64	3.07	2.29	2.68	3.01	2.41	2.98	2.45

TABLE 20.—TEMPERATURE OF THE WATER in the Well at the State Capitol in **Lansing, Mich.**, by Months for the thirteen years, 1885-97, and the last four months of the year 1884; also averages for the eleven years, 1886-96.

Year and period of years.	Year.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1884.....										50	51	51	49
1885.....	47	49	47	43	42	46	48	47	48	50	50	51	45
1886.....	48	49	47	46	45	46	46	47	50	52	52	51	50
1887.....	48	50	41	42	46	47	48	49	51	50	51	52	51
1888.....	49	50	49	48	47	48	48	47	50	51	51	52	51
1889.....	50	50	49	49	48	49	49	50	50	50	51	51	51
1890.....	50	50	49	49	48	49	49	49	50	51	51	52	51
1891.....	50	50	49	49	48	49	49	49	50	51	51	51	51
1892.....	50	50	50	49	49	49	50	49	50	51	53	52	52
1893.....	50	50	48	47	48	48	49	49	50	51	52	52	51
1894.....	51	51	50	49	49	49	49	50	50	52	52	53	52
1895.....	49	51	46	48	50	49							51
1896*	51			46	49	51	51	51	53	53	52	54	51
1897.....	51	50	49	47	49	50	53	51	52	54	52	53	50
Av. 11 yrs., 1886-96†	50	50	48	47	48	49	49	49	50	51	52	52	51

* In 1896, during January and February, the well at Lansing was dry; therefore the average temperature for that year is taken for the ten months when there was water in the well.

† The average temperature of the water in the well at Lansing for 1886-96 is necessarily incomplete for the reason that for the six months, June, July, August, September, October, and November, in 1895, there was no water in the well at Lansing, hence, no temperature; therefore the average temperature is taken for the eleven years, 1886-96, for those months where the water was present in the well, and during those months when the well was dry, the average temperature for the ten years, 1886-95, is taken.

TABLE 21.—Sickness from Typhoid Fever in Michigan (as indicated by the weekly card-reports by all observers) and the depth of earth (in inches) above the water in the well, and the temperature of the water in the well at **Lansing, Michigan**, averages by Year and Months for the eleven years, 1886-96.

	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Sickness from Typhoid Fever*.....	10	7	5	4	3	4	5	7	14	19	21	16	11
Inches of earth above water in well.....	300	302	302	300	298	298	296	296	299	301	303	305	305
Temperature of water in well†.....	50	50	48	47	48	49	49	49	50	51	52	52	51

* Per cent of all reports received (from observers in different parts of the State) which stated the presence of typhoid fever, from last line in Table 18.

† This line is copied from the last line in Table 16.

‡ This line is copied from the last line in Table 20.

TABLE 22.—*Exhibiting the Average Total Annual Rainfall at Stations in Michigan, the same for Lansing, the inches of earth above the ground water at Lansing, the inches of water in an undisturbed well at Lansing, and the reported sickness, from Typhoid Fever in Michigan, as indicated by the per cent of all the weekly card-reports which stated the presence of Typhoid Fever, during each of the 13 years, 1885-97, and averages for the 11 years, 1886-96.*

Year, and period of years.	Average total Annual Rainfall at Stations in Michigan, in inches.	Total Annual Rainfall at Lansing, in inches.	Inches of earth above the Ground Water at Lansing.	Inches of water in an unused well at Lansing.	Ground Water higher (+) or lower (-) than the 11 years' Average, in inches.	Average Per Cent of all weekly card-reports stating the Presence of Typhoid Fever.	More (+) or less (-) Sickness from Typhoid Fever than the eleven years' Average.
1885.....	35.82	34.51	284	40	+14	8	-2
1886.....	32.16	29.52	281	43	+17	8	-2
1887.....	29.82	30.08	290	34	+8	10	0
1888.....	29.55	25.76	294	30	+4	10	0
1889.....	28.18	23.28	304	20	-6	10	0
1890.....	30.20	33.96	300	24	-2	8	-2
1891.....	31.66	29.05	301	24	-2	11	+1
1892.....	33.08	31.97	301	23	-3	9	-1
1893.....	36.34	39.52	295	29	+3	9	-1
1894.....	28.74	24.96	298	26	0	11	+1
1895.....	27.06	27.52	322	5	-21	13	+3
1896.....	32.65	32.78	319	5	-21	10	0
1897.....	32.15	34.38	306	18	-6	7	-3
A v. 11 yrs., 1886-96..	30.86	29.85	300	24	-----	10	-----

* The figures in the line for 1887, and in the line for the average for the ten years, 1878-87, in this table do not exactly agree with those in the same lines in the table printed on page lvi, of the report of this board for the year 1888, for the reason that the table printed in the report for 1888 was made before the cards were all compiled for the year, and was taken from the compilation (of the card reports first received) for the quarterly reports. The line "Average 10 years 1878-87," included the data for the year 1887, and consequently is not exactly, although it is substantially, the same as in the above table.

† Since May, 1885, physicians have reported only the prevalence of diseases under their own observation. Previous to that time diseases which were believed to be present (under the care of other physicians) were so reported. This undoubtedly accounts for a part of the sudden decrease in 1885 and 1886 as compared with the preceding years.

MEASLES IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1897.

There were reported to the Secretary of the State Board of Health, in all, 794 outbreaks of measles, in 634 local jurisdictions, as having occurred in Michigan during the year 1897; and in these outbreaks there were reported to have occurred 32,543 cases and 159 deaths.

The office of the State Board of Health is making constant efforts to get local health officials, and especially to induce the people generally, to take measures to prevent the spread of measles, and to make reports to the local health officers so that they can make valuable reports to the Secretary of the State Board of Health, concerning that disease in the several localities; but it is probable that a large number of the cases, and possibly some deaths, are not yet reported.

MEASLES IN 1897, COMPARED WITH PREVIOUS YEARS.

According to Reports made to the Secretary of the State Board of Health.

TABLE 1.—*Exhibiting the numbers of outbreaks, cases and deaths from Measles, the Number of localities in which they occurred, together with the average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, reported to the Office of the State Board of Health for each of the eight years, 1890-97; with the departure of the same for 1897, from 1896, and from the average of the same for the seven years, 1890-96.*

Year.	Reported Outbreaks.	Reported Localities.	Reported Cases.	Av. No. of Cases per Outbreak.	Reported Deaths.	Av. No. of Deaths per Outbreak.	Deaths Per 100 Cases.
1890.....	421	407	*11,911	28.3	140	.33	1.2
1891.....	394	379	*12,173	30.9	149	.33	1.2
1892.....	238	229	*3,830	16.1	76	.32	2.0
1893.....	365	326	*7,334	20.1	119	.33	1.6
1894.....	359	339	10,518	29.3	55	.15	.5
1895.....	268	238	3,870	14.4	12	.04	.3
1896.....	405	366	15,409	38.0	156	.39	1.0
1897.....	794	634	32,543	41.0	159	.20	.5
Average for 7 years, 1890-1896.....	350	326	9,292	26.5	101	.29	1.1
Departure of 1897 from 1896.....	+389	+268	+17,134	+3.0	+3	—19	—5
Departure of 1897 from the average for 7 years, 1890-96.	+444	+308	+23,251	+14.5	+58	—09	—6

* Only the fatal cases were reported from Detroit.

The compilation of information relative to the prevalence of measles in Michigan, as reported to the office of the Secretary of the State Board of Health, has been continued for a number of years. In Table 1, beginning

with the year 1890, are shown, by years, the numbers of reported outbreaks of measles, the numbers of infected localities, the numbers of cases and deaths reported as having occurred from this disease in each year, the average reported cases and deaths per outbreak, and the per cent ratio of deaths to cases. According to the reports to the Secretary of the State Board of Health, there is marked fluctuation from year to year in the prevalence of this disease.

TABLE 2.—*Exhibiting the Population of Michigan for the year 1897, by tiers of counties (Upper Peninsula as one tier); also the number of cases and the number of deaths from Measles REPORTED from each of these divisions for 1897, and the numbers of cases and deaths per 10,000 population of each division.*

Counties in Groups, most Northern ones First.			Estimated Population, 1897.*	Reported Cases of Measles, 1897.	Reported Cases per 10,000 of Population.	Reported Deaths from Measles, 1897.	Reported Deaths per 10,000 of Population.
State.....			2,352,455	32,543	138.34	159	.68
Upper Penin- sula.....	Alger.	Mackinac.	226,143	1,184	52.36	1	.04
	Delta.	Chippewa.					
	Schoolcraft.	Keweenaw.					
	Luce.	Marquette.					
	Houghton.	Iron.					
Eleventh tier of counties...	Ontonagon.	Menominee.	46,408	1,187	255.77	6	1.29
	Gogebic.	Dickinson.					
	Baraga.						
Tenth tier of counties.....	Emmet.	Cheboygan.	52,218	1,578	302.19	8	1.53
	Charlevoix.	Presque Isle.					
	Leelanau.						
Ninth tier of counties.....	Antrim.	Alpena.	46,497	891	191.63	7	1.51
	Otsego.						
	Montmorency.						
Eighth tier of counties.....	Benzie.	Crawford.	69,267	1,093	157.79	7	1.01
	G'd Traverse.	Oscoda.					
	Kalkaska.	Alcona.					
Seventh tier of counties...	Manistee.		164,859	330	20.02	9	.55
	Wexford.	Ogemaw.					
	Missaukee.	Iosco.					
Sixth tier of of counties...	Roscommon.		95,458	961	100.67	2	.21
	Mason.	Gladwin.					
	Lake.	Bay.					
Fifth tier of counties.....	Osceola.	Huron.	251,793	1,797	71.37	7	.28
	Clare.	Arenac.					
	Oceana.						
Fourth tier of counties.....	Newaygo.	Midland.	395,525	8,992	227.34	34	.86
	Mecosta.						
	Isabella.						
Third tier of counties.....	Muskegon.	Tuscola.	233,901	4,635	198.16	21	.90
	Montcalm.	Sanilac.					
	Gratiot.						
Second tier of counties.....	Saginaw.	Shiawassee.	537,157	4,650	86.57	35	.65
	Ottawa.	Genesee.					
	Kent.	Lapeer.					
First tier of counties.....	Ionia.	St. Clair.	233,301	5,245	224.82	22	.94
	Allegan.	Livingston.					
	Barry.	Oakland.					
	Eaton.	Macomb.	537,157	4,650	86.57	35	.65
	Ingham.						
	VanBuren.	Washtenaw.					
	Kalamazoo.	Wayne.	233,301	5,245	224.82	22	.94
	Calhoun.						
	Jackson.						
	Berrien.	Hillsdale.	233,301	5,245	224.82	22	.94
	Cass.	Lenawee.					
	St. Joseph.	Monroe.					
	Branch.		537,157	4,650	86.57	35	.65

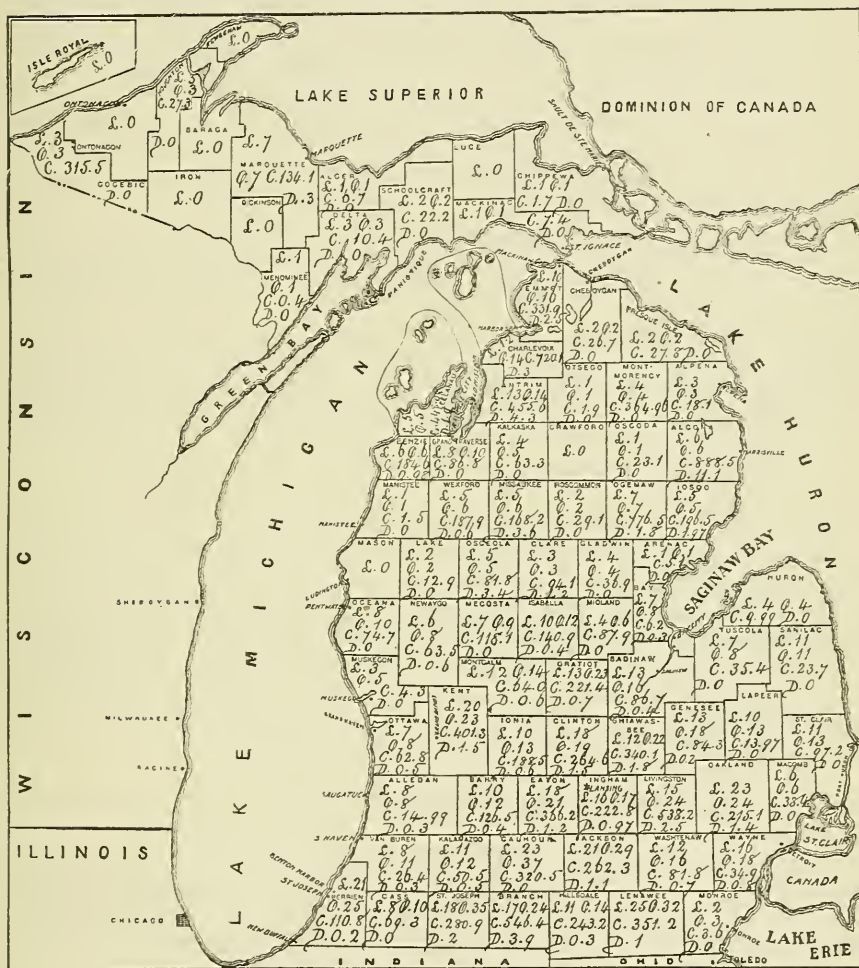
* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894.

TABLE 3.—Numbers of Cases and Deaths reported from Measles per 10,000 persons living in each county in Michigan during the year 1897. (Compiled from reports of health officers, clerks, etc.)

State and Counties.	Estimated Population of Michigan for 1897.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated Population of Michigan for 1897.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,352,455	32,543	159	138.34	.68	Keweenaw.....	2,873	0	0	0	0
						Lake.....	5,441	7	0	12.87	0
Alcona.....	5,425	482	6	888.48	11.06	Lapeer.....	28,628	40	0	13.97	0
Alger.....	1,495	1	0	6.69	0	Leelanau.....	10,624	477	2	448.98	1.88
Allegan.....	39,360	59	1	14.99	.25	Lenawee.....	48,611	1,707	5	351.16	1.03
Alpena.....	19,319	350	0	18.12	0	Livingston.....	20,121	1,083	5	538.24	2.48
Antrim.....	13,938	635	6	455.59	4.30	Luce.....	2,268	0	0	0	0
Arenac.....	7,888	4	0	5.07	0	Mackinac.....	6,792	5	0	7.36	0
Baraga.....	5,129	0	0	0	0	Macomb.....	32,818	126	0	38.39	0
Barry.....	23,636	299	1	126.50	.42	Manistee.....	27,527	4	0	1.45	0
Bay.....	64,973	40	2	6.16	.31	Marquette.....	39,454	529	1	134.08	.25
Benzie.....	10,183	188	1	184.62	.98	Mason.....	19,950	0	0	0	0
Berrien.....	48,898	542	1	110.84	.20	Mecosta.....	21,503	254	0	118.12	0
Branch.....	25,769	1,408	10	546.39	3.88	Menominee.....	24,646	1	0	.40	0
Calhoun.....	50,450	1,617	0	320.52	0	Midland.....	15,139	133	0	87.85	0
Cass.....	21,343	148	0	69.34	0	Missaukee.....	8,385	141	3	168.16	3.58
Charlevoix.....	10,012	721	3	720.14	3.00	Monroe.....	33,814	12	0	3.55	0
Cheboygan.....	15,336	41	0	26.73	0	Montcalm.....	35,299	226	2	64.02	.57
Chippewa.....	17,799	3	0	1.69	0	Montmorency.....	3,151	115	0	364.96	0
Clare.....	8,290	78	1	94.09	1.21	Muskegon.....	35,307	15	0	4.25	0
Clinton.....	26,077	690	4	264.60	1.53	Newaygo.....	18,112	115	1	63.49	.55
Crawford.....	2,521	0	0	0	0	Oakland.....	43,749	941	6	215.09	1.37
Delta.....	22,211	23	0	10.36	0	Oceana.....	17,275	129	0	74.67	0
Dickinson.....	15,261	0	0	0	0	Ogemaw.....	5,679	441	1	776.54	1.76
Eaton.....	33,011	1,209	4	366.24	1.21	Ontonagon.....	9,211	0	0	0	0
Emmet.....	12,231	406	3	331.94	2.45	Osceola.....	17,859	146	6	81.75	5.31
Genesee.....	41,395	349	1	84.31	.24	Oscoda.....	1,733	4	0	23.08	0
Gladwin.....	5,419	20	0	36.91	0	Osego.....	5,186	1	0	1.93	0
Gogebic.....	14,771	466	0	315.48	0	Ottawa.....	41,877	263	2	62.80	.48
Gr'd Traverse.....	20,635	179	0	86.75	0	Presque Isle.....	6,829	19	0	27.82	0
Gratiot.....	28,857	639	2	221.44	.69	Roscommon.....	1,375	4	0	29.09	0
Hillsdale.....	29,981	729	1	243.15	.33	Saginaw.....	81,528	707	3	86.72	.37
Houghton.....	50,630	138	0	27.26	0	Sanilac.....	34,962	83	0	23.74	0
Huron.....	35,039	35	0	9.99	0	Schoolcraft.....	8,109	18	0	22.20	0
Ingham.....	41,206	918	4	222.78	.97	Shiawassee.....	34,281	1,166	6	340.13	1.75
Ionia.....	36,334	685	2	188.53	.55	St. Clair.....	55,983	544	0	97.17	0
Iosco.....	10,177	200	2	196.52	1.97	St. Joseph.....	24,885	699	5	280.89	2.01
Iron.....	5,494	0	0	0	0	Tuscola.....	35,840	127	0	35.44	0
Isabella.....	23,430	330	1	140.85	.43	Van Buren.....	31,447	83	1	26.39	.32
Jackson.....	47,663	1,250	5	262.26	1.05	Washtenaw.....	44,483	364	3	81.83	.67
Kalamazoo.....	44,143	223	2	50.52	.45	Wayne.....	318,971	1,113	24	34.89	.75
Kalkaska.....	6,000	38	0	63.33	0	Wexford.....	16,124	303	1	187.92	.62
Kent.....	130,950	5,255	19	401.30	1.45						

* Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894.

DISTRIBUTION OF MEASLES IN MICHIGAN IN 1897.
BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000
INHABITANTS.



DISTRIBUTION OF MEASLES BY DIVISIONS AND COUNTIES DURING 1897.

Table 2 exhibits the distribution of measles in 1897, by tiers of counties of the State according to the reports to the Secretary of the State Board of Health; showing the reported numbers of cases and deaths and sickness-rates and death-rates for each division. Table 3 and the accompanying map exhibit in slightly different ways the reported measles by counties during the year 1897.

Sickness-rates from Reported Measles in 1897.

Considering the State by tiers of counties, the greatest reported prevalence of measles was in the tenth tier of counties, where the sickness-rate was 302.19 cases per 10,000 inhabitants. The next highest sickness-rates were in the eleventh, fourth and first tiers.

The lowest sickness-rate, 20.02 cases per 10,000 inhabitants, was in the seventh tier. Four other tiers, the Upper Peninsula, fifth, second and sixth tiers were below the average rate for the State.

By counties the greatest sickness-rate from this disease was in Alcona county, where the ratio of cases to population was 888.48 per 10,000. Other counties where the sickness-rates were largely in excess of the average rate for the whole State were: Ogemaw, 776.54; Charlevoix, 720.14; Branch, 546.39; Livingston, 538.24; Antrim, 455.59 and Leelanau, 448.98.

The lowest sickness-rate by counties, .40 of one case per 10,000 inhabitants, was in Menominee county. Chippewa, 1.69, Manistee, 1.45, and Otsego, 1.93, had the next lowest rates. Measles was reported from all but eight counties, six of these being in the Upper Peninsula.

Death-rates from Measles in 1897, According to the Reports.

Aside from the Upper Peninsula, which had the lowest death-rate, .04 of one death per 10,000 inhabitants, the four northern tiers of counties had the highest death-rates. Of these the tenth had the highest rate.

By counties, the highest death-rate, 11.06 deaths per 10,000 inhabitants was in Alcona county, which was nearly three times that of any other county and about sixteen times the average for the State. In 34 counties from which measles were reported there were no deaths reported. The lowest death-rate, .20 of one death per 10,000 inhabitants, in counties from which deaths were reported, was in Berrien county.

The Fatality, or "Case-Mortality" from Measles.

The fatality from measles in 1897, *i. e.*, the proportion of reported cases which proved fatal, was for the whole State, .5 of one death to each 100 cases reported. The maximum fatality (5 per cent) occurred in Bay county; the next highest fatalities were in Osceola county (4 per cent) and Wayne county (2 per cent).

In localities where all cases were reported, it is plain that the case-mortality would be much less than in localities in which the mild cases were not so generally reported. Until the reports come to be equally general throughout the State, probably the most useful conclusion to draw from the relative fatality apparent from the returns is the probable degree of thoroughness of the reports of mild cases in the several parts of the State.

*Number of Outbreaks of Measles in Each Month of the Year 1897.*TABLE 4.—*Exhibiting the number of outbreaks of Measles which were reported to have begun, ended, and were present in each Month of the Year 1897, in Michigan.*

Outbreaks.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Number began.....	60	77	95	129	88	72	34	26	19	17	33	42	692
Number ended.....	18	23	52	67	68	109	90	65	19	11	18	41	581
Number present.....	96	144	209	274	275	261	174	107	57	54	76	97	794

The last line of figures in Table 4, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 111 more beginnings than endings of outbreaks reported during the year 1897. Nine outbreaks which were present and ended in January were outbreaks which began in 1896 and in which no new cases occurred in 1897.

TABLE 5.—*Exhibiting the Number and Per Cent of Cases of Measles and the Number and per cent of Localities infected in Michigan in each Month during the year 1897. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Number of cases present..	1,319	2,281	3,023	3,773	4,882	4,199	1,803	492	348	458	772	1,256
Per cent of cases present..	4	7	9	12	15	13	6	2	1	1	2	4
Number of localities.....	93	138	193	265	269	260	173	107	57	54	75	94
Per cent of localities.....	15	22	30	42	42	41	27	17	9	9	12	15
Number of cases taken sick.....	1,197	1,512	2,378	2,789	3,375	3,085	885	330	327	358	514	971
Per cent of cases taken sick.....	4	4	7	9	10	9	3	1	1	1	2	3

The second line of figures in Table 5 exhibits the per cent the cases present in each month, and the last line of figures exhibits the per cent of the cases taken sick in each month, are of the total number of cases, 32,543, reported to this office for the year 1897. The fourth line exhibits the per cent the localities infected in each month are of the total number, 634, infected during the year. Seven of the localities which were infected in January were infected by outbreaks which began in 1896, and in which

cases were still present in January, 1897, although no new cases occurred in these localities in that month.

Source of Contagium of Cases of Measles.

Of the 32,543 cases of measles reported during the year 1897, as exhibited in the following table, the local health officers reported the source of contagium, as follows: Traced to a former case, 9,585; probably traced to a former case, 38; attributed to infected houses, articles, clothing, etc., 4; source of contagium unknown, 18,437; source of contagium not stated, 4,182; traced to an outside jurisdiction, 269; probably from an outside jurisdiction, 28.

TABLE 6.—*Reported Source of Contagium of Cases of Measles in Michigan during the year 1897.*

	Cases..
Traced to a former case.....	9,585
Probably traced to a former case.....	38
Attributed to infected houses, articles, clothing, etc.....	4
Source of contagium unknown, or reports not definite (including "Exposure," "Contagium," "Endemic" and "Sporadic").....	18,437
Source of contagium not stated.....	4,182
Traced to outside jurisdictions.....	269
Probably from an outside jurisdiction.....	28
All cases.....	32,543

Movements of Contagium of Measles in Michigan in 1897.

Table 7 shows the spread of contagium of measles in 1897. For several years past a map illustrating the direction of the movements of contagium of measles has been made. For 1897, the instances in which the contagium was traceable to former cases are so numerous that their insertion in a map is found to be impracticable.

TABLE 7.—*First, second and third localities, where the second locality was infected with Measles from the first, and the third was infected from the second; and the numbers of cases and deaths from Measles in the first, second and third localities with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Alpena county: Alpena city..... (1896-June.)	224	0	Alcona county: Caledonia township... (Jan.-Feb. 27.) Harrisville village... (Feb. 3-Apr. 30.) Alpena county: Maple Ridge township... (Jan. 19-Apr. 18.) Wilson township..... (Jan. 17-Mar. 11.) Iosco county: Tawas city..... (— Apr. 3.) Presque Isle county: Rogers City village... (Feb. 4-Feb. 20.)	5 110 113 13 57 1	0 2 0 0 0 0	Iosco county: Au Sable township... (Jan.-June.) East Tawas city..... (Jan.-June.)	50 53	1 0
Antrim county: Banks township..... (Sept.-Dec.)	150	2	Antrim county: Kearney township.... (— Sept. 29.)	2	2			
Antrim county: Bellaire village..... (— Oct. 15.)	3	0	Antrim county: Central Lake tp.....	20	0	Leelanau county: Empire village..... (Oct. 20-Nov. 12.)	3	0
Antrim county: Central Lake village... (June-Dec.)	308	1	Antrim county: Star township..... (Dec. 20-Feb. 6, 1898.) Torch Lake township... (Aug. 1-Nov. 16)	12 36	0 1			
Antrim county: Helena township.....	*	—	Kalaska county: Kalaska village..... (May 7-Nov. 25.)	22	0	Kalkaska county: Kalkaska tp..... (May-May 20.)	1	0
Barry county: Barry township.....	*	—	Kent county: Bowne township..... (May 8-July 1.)	93	0			
Bay county: Bay city..... (Nov.-Feb., 1898.)	200	4	Gratiot county: Alma village..... (Dec. 20—)	2	0			
Bay county: Pinconning village....	*	—	Roscommon county: Nester township..... (May 2-June 5.)	3	0			
Benzie county: Platte township.....	*	—	Alger county: Burt township..... (Aug. 6-Aug. 21.)	1	0			
Berrien county: St. Joseph city..... (May 1-July.)	80	1	Berrien county: Benton Harbor city... (— Oct. 31.) Stevensville village... (June 20-July 1.)	229 7	0 0	Berrien county: Watervliet tp..... Van Buren county: Keeler township.... (Aug. —) South Haven vil..... (July 15 —)	16 3 1	0 0 0

* Measles was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from first.			Third Localities infected from second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Berrien county: Three Oaks village..... (Apr.-May 4)	7	0	Berrien county : Gallen township..... New Buffalo village... Royalton township.... (Apr. 17-Aug. 25.)	23 1 16	0 0 0			
Branch county: Bethel township..... (Mar. 11-June 15.)	186	0	Branch county : Kinderhook township (Apr. 20-May 2.)	2	0			
Branch county: Bronson village..... (1896-Apr. 1.)	31	0	St. Joseph county: Sturgis city..... (Feb. 10-Mar. 10.)	10	0			
Branch county: Coldwater township... (Apr. 3-May 22.)	131	5	Branch county: Batavia township.... (— May.)	15	0			
Branch county: Mattison township..... (Mar. 19-Apr)	11	0	St. Joseph county: Colton township..... (Apr. 14-Aug. 15.)	17	0			
Branch county: Noble township..... (Mar. 6-May 20.)	39	0	Branch county: Gilead township..... (Apr. 17-June 27.)	46	0			
Branch county: Sherwood township.... (Mar.-July.)	150	0	Branch county: California township... (May 2 —.)	3	0			
			Branch county: Mattison township... (May 17-July 9.)	29	2			
Branch county: Sherwood village.....	*		St. Joseph county: Colton township..... (Sept. 6-Oct. 2.)	7	0	Calhoun county: Le Roy township... (Oct. 28-Dec. 17.)	10	0
			St. Joseph county: Leonidas township... (May 12 —.)	1	0			
			Calhoun county: Albion township..... (May 7-July 3) Albion township..... (Oct. 26-Dec. 31.) Lee township..... (Dec. 7, 1898.) Marengo township.... (Mar. 11-Feb. 26, 1898.)	4 10 18 37	0 0 0 0			
Calhoun county: Albion city..... (Mar. 14-Feb. 24, 1898.)	467	0	Eaton county: Brookfield township... (Oct. 27-Nov. 16.)	4	0			
			Hillsdale county: Litchfield township... (Nov. —-May 20.)	44	1			
			Jackson county: Parma township..... (Oct. 18-Dec.)	25	0			
			Barry county: Johnstown township.. (Apr.-May 10.)	18	0			
Calhoun county: Battle Creek city..... (Jan 12-Nov. 7.)	67	0	Calhoun county: Bedford township..... (Mar. 25-Apr. 12.)	2	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Calhoun county: Battle Creek city..... (Jan. 12-Nov. 7.)	67	0	Calhoun county: Convis township..... (Mar. 8-June 20.)	19	0			
			Penfield township..... (Mar. 18-Apr. 17.)	7	0			
			Cheboygan county: Mackinaw city village (June 10-June 20.)	1	0			
Calhoun county: Burlington village.....	*	—	Calhoun county: Athens village..... (Mar. 10-June 15.)	70	0	St. Joseph county: Leonidas township... (Apr. 11-Apr. 23.)	1	0
Calhoun county: Burlington township....	*	—	Calhoun county: Athens township..... (Mar. 30-June 10.)	75	0	Branch county: Batavia township... (Apr. 28—.)	1	0
			Branch county: Union City village..... (Mar. 31-May 26.)	150	0	St. Joseph county: Leonidas township... (Apr. 23-May 3.)	1	0
Calhoun county: Eckford township..... (Dec. —.)	100	0	Calhoun county: Marengo township..... (Dec. —.)	1	0			
Calhoun county: LeRoy township..... (Oct. 28-Dec. 17.)	10	0	Calhoun county: Athens township..... (Dec. 21-Jan. 1898.)	3	0			
			Allegan county: Allegan village..... (June 3-July 1.)	3	0			
Calhoun county: Marshall city..... (June 3-Jan. 15, 1898.)	149	0	Calhoun county: Bedford township..... (Dec. 12—.)	1	0			
			Marengo township..... (—Dec.)	2	0			
			Hillsdale county: Litchfield village..... (Nov. 24, 1898.)	22	0			
			Calhoun county: Clarendon township... (Apr. 1-Dec.)	60	0	Branch county: Butler township..... (June 22—.)	1	0
Calhoun county: Tekonsha village..... (Mar. 16-May 8.)	75	0	Homer village..... (Apr. 6-Aug.)	110	0	St. Joseph county: Colon township..... (June —.)	1	0
			Hillsdale county: Hillsdale city.....	1	0			
Cass county: Dowagiac city..... (May 5-May 20.)	6	0	Cass county: Cassopolis village..... (—July.)	6	0	Cass county: LaGrange township... (May 7-June 5.)	6	0
			Cass county: Cassopolis village..... (Apr. 18-May 10.)	2	0			
			Volinia township..... (Mar. 1-Mar. 25.)	3	0			
Cass county: Marcellus village..... (—Mar.)	100	0	St. Joseph county: Flowerfield township.. (Mar. 16-Apr. 18.)	54	2			
			Three Rivers city..... (Mar. 26—.)	1	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities Infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Charlevoix county: Charlevoix village..... (Oct. 10-Mar. 18, 1898.)	100	0	Emmet county: Petoskey city.....	1	0	Leelanau county: Sutton's Bay tp..... (Nov.-Mar. 3, 1898.)	50	3
Clinton county: Bath township.....	100	0	Leelanau county: Leelanau township..... (Oct. 27-Dec. 28.)	446	1	Antrim county: Jordan township*..... (May 25-July 25.)	36	0
Clinton county: St. Johns village..... (Mar. 20-.)	81	1	Ingham county: Meridian township..... (Feb. 27-.)	125	0	Shiawassee county: Woodhull township..... (Mar. 6-July 8.)	88	1
Eaton county: Charlotte city..... (-Dec. 31.)	300	1	Clinton county: Greenbush township... (Apr. 1-July 3.)	57	1	Calhoun county: Clarence township.. (Apr. 8-Apr. 27.)	11	0
			Barry county: Maple Grove township (Mar. 8-Apr. 1.)	2	0	Eaton county: Brookfield township (Apr. 11-July 12.)	69	0
			Nashville village..... (June 21-June 30.)	1	0	Windsor township.. (Apr. 12-May 16.)	7	0
			Eaton county: Bellevue township..... (May 2-July.)	11	0	Hillsdale county: Hillsdale city †..... (Apr. 1-Aug.)	639	1
			Brookfield township... (Apr. 5-Apr. 17.)	1	0	Ingham county: Mason city..... (Mar. 10-Apr. 10.)	5	0
			Carmel township..... (Feb. 2-June 15.)	9	0	Onondaga township. (Apr. 15-July 10.)	150	0
			Chester township..... (Mar. 1-Apr. 30.)	26	0	Jackson county: Springport village.. (Apr. 23-May 12.)	3	0
			Eaton Rapids city..... (Feb.-May 19.)	175	2			
			Kalamo township..... (Feb. 2-July.)	73	1			
			Roxand township..... (Feb.-Apr.)	10	0			
Eaton county: Grand Ledge city..... (Feb.-June.)	88	0	Clinton county: Watertown township.. (June 20-June 28.)	1	0			
Emmet county: Littlefield township.... (May 12-Sept. 9.)	89	1	Emmet county: Maple River township.. (June 7-July.)	8	0			
Emmet county: Little Traverse t'p.....	21	1	Emmet county: Petoskey city..... (Oct.-)	1	0			
Emmet county: Petoskey city..... (May 21-July, 1898.)	207	1	Emmet county: Bear Creek township.. (Dec. 26-Feb. 4, 1898.)	8	0	Antrim county: Mancelona village... (Nov. 19-Dec. 28.)	5	0
			Bliss township..... (Dec. 19-Jan. 3.)	1	0	Emmet county: Littlefield township.. (Nov. 25-Jan. 5, '98.)	7	0
			Harbor Springs village (July 15-Mar., 1898.)	200	1	Maple River tp..... (Aug. 1-Aug. 14.)	1	0
			Charlevoix county: Chandler township.... (Sept. 20-Oct. 14.)	4	0	Genesee county: Flint city..... (Nov. 19-Jan. 6, '98.)	4	1
			Melrose township..... (Aug. 3-Aug. 12.)	1	0			

* From Jordan Tp., measles was spread to East Jordan Vil., Charlevoix Co. (100 cases.) From East Jordan Vil. to Fife Lake Vil., Grand Traverse Co. (50 cases.) From Fife Lake Vil. to Union Tp., Grand Traverse Co. (37 cases and 1 death.)

† From Hillsdale city measles was spread to Jonesville Vil. (1 case), and to Ransom Tp., Hillsdale Co. (6 cases.)

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Emmet county: Petoskey city..... (May 21-July, 1898.)	207	1	Mackinac county: St. Ignace city..... (Nov. 2-Dec. 15.)	5	0			
Emmet county: Resort township..... (June—.)	4	0	Charlevoix county: Hayes township..... (Dec.-Mar., 1898.)	16	0			
Emmet county: West Traverse tp.....	*	—	Emmet county: Friendship township... (Dec. 11—.)	1	0			
Genesee county: Gaines township.....	20	0	Saginaw county: Chesaning township... (Jan. 12-Jan. 19.)	2	0			
Genesee county: Linden village.....	27	0	Genesee county: Benton village..... (May 1-June 30.)	17	0			
Genesee county: Vienna township..... (1896-Mar. 27.)	20	0	Saginaw county: Birch Run township... (Sept. 14—.)	20	0			
Genesee county.....	—	—	Eaton county: Benton township..... (Jan. 16—.)	30	0	Eaton county: Kalamo township... (Feb. 9-Feb.)	2	0
Gladwin county: Clement township.....	*	—	Gladwin county: Bourett township..... (July 6-July 31.)	5	0	Sunfield township... (Feb. 3—)	20	0
Grand Traverse county: Mayfield township.....	*	—	Ogemaw county: Edwards township..... (Aug. 10—.)	7	0			
			Grand Traverse county: Kingsley village..... (June 1-July 29.)	24	0			
			Paradise township.....	50	0			
			Grand Traverse county: Blair township..... (May 27-June 22.)	7	0			
Grand Traverse county: Traverse City..... (Jan. 2-Dec.)	18	0	Leelanau county: Glen Arbor township... (Apr.—)	10	0	Missaukee county: Lake City village... (June-July 10.)	4	0
			Wexford county: Manton village..... (Apr. 30-July 5.)	200	1	Wexford county: Cadillac city..... (June-July 17.)	10	0
Gratiot county: Elba township..... (Mar.-June.)	65	1	Genesee county: Flushing village..... (Apr. 4-Apr. 17.)	1	0	Cedar Creek tp..... (May-Sept.)	50	0
Gratiot county: North Star township..	1	1	Gratiot county: Newark township..... (Aug. 20-Aug. 28.)	1	0			
Gratiot county: Pine River township...	*	—	Gratiot county: Alma village..... (Nov. 22-May 6, 1898.)	368	2	Gratiot county: Arcada township... (Dec. 19-May 20, '98.)	60	0
Gratiot county: St. Louis city..... (July -Dec. 20.)	67	0	Gratiot county: Bethany township..... (Nov. 21-Dec. 25.)	37	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Gratiot county: St. Louis city..... (July-Dec. 20.)	67	0	Gratiot county: Emerson township..... (Oct. 14-Oct. 28.) Summer township..... (Aug. 6-Sept. 1.) Isabella county: Shepherd village..... (Oct. 28-Apr. 8, 1898.)	2 3 69	0 0 0			
Hillsdale county: Wheatland township...	*	---	Hillsdale county: North Adams tp. (Apr. 10-Aug. 1.)	16	0			
Hillsdale county: Woodbridge township..	*	---	Hillsdale county: Amboy township..... (July 18-Aug. 14.)	8	0			
Hillsdale county.....			Branch county: Butler township..... (June 18-June 20.)	9	0			
			Charlevoix county: South Arm township.. (May-Mar., 1898.)	208	3			
			Clinton county: Watertown township.. (Feb. 18-May.)	100	1	Clinton county: Riley township..... (Mar. 20-Aug. 12.)	44	0
			Genesee county: Flushing township..... (Apr. 12-July.)	24	0			
Ingham county: Lansing city..... (Jan. 13-July.)	280	4	Gratiot county: Ithaca village..... (Apr. 23—)	1	0			
			Hillsdale county: Allen township..... (Apr. 21-Aug. 25.)	15	0			
			Ingham county: Delhi township..... (Jan.-Mar. 25.)	30	0			
			Lansing township..... (Feb. 20-Mar. 12.)	2	0			
			Kent county: Bowne township.....	1	0			
			Shiawassee county: Perry village..... (Jan. 1-Mar. 28.)	51	0			
Ingham county: Leslie village..... (—May.)	40	0	Ingham county: Mason city..... (June 19-July 30.)	12	0			
Ingham county: Williamston village.... (Jan. 13—)	25	0	Ingham county: Wheatfield township.. (Apr. 15-June 10.)	3	0			
Ionia county: Belding city..... (Jan.-Apr.)	205	1	Gratiot county: Ithaca village..... (Apr. 12—)	383	0	Gratiot county: Alma village..... (May 12-May 30.) Emerson township.. (May 24—) Emerson township.. (June 7-July 15.) Newark township.. (Apr. 29-July 14.)	6 17 1 30	0 0 0 0

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Ionia county: Belding city..... (Jan.-Apr.)	205	1	Gratiot county: Ithaca village..... (Apr. 12 —.)	383	0	Ionia county: Ronald township....	1	0
			Ionia county: Ionia city..... (May-July.)	212	0	Montcalm county: Richland township.. (May 23-June 6.)	1	1
			Ronald township..... (Apr. 5-July 1.)	59	0	Delta county: Gladstone city..... (June 14 July 1.)	2	0
			Montcalm county: Greenville city..... (Apr. 20-Apr. 30.)	10	0	Kent county: Lowell village..... (June 1-June 28.)	4	0
Ionia county: Lake Odessa village....	*	---	Gratiot county: Ithaca village.....	1	0	Kent county: Cedar Spr'gs village (May 27-July 24.)	25	0
Ionia county: Saranac village.....	80	0	Ionia county: Berlin township..... (Apr. 3-Apr. 29.)	12	0	Mecosta county: Mecosta township.. (— Apr. 28.)	6	0
Isabella county: Chippewa township....	*	---	Campbell township.... (Apr. 20-June 20.)	85	0	Montcalm county: Douglas township... (Apr.-June 20.)	24	0
Jackson county: Blackman township....	*	---	Midland county: Homer township..... (June 27 —.)	1	0			
Jackson county: Brooklyn village..... (Jan. 19-Jan. 31.)	1	0	Jackson county: Spring Arbor township (Apr. 1-Apr. 17.)	2	0			
			Jackson county: Columbia township.... (Feb.-July 20.)	200	0			
			Barry county: Irving township..... (Mar. 18-July 30.)	160	0			
			Berrien county: Berrien Springs village (July 9-July 18.)	1	0			
			Niles city..... (Feb.-Aug. 10.)	98	0			
Jackson county: Jackson city..... (Feb.-May.)	400	3	Calhoun county: Marengo township.... (Mar. 10-Apr. 1.)	4	0			
			Emmet county: Petoskey city..... (May —.)	1	0			
			Hillsdale county: Ransom township..... (Apr. 12-May 30.)	3	0			
			Jackson county: Concord village..... (Mar. 27-June 5.)	26	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Jackson county: Jackson city..... (Feb.—May.)	400	3	Jackson county: Concord township..... (Apr. 16–June 3.)	65	0	Jackson county: Grass Lake village..... (Apr. 1–June 1.)	70	0
			Hanover township..... (Apr. 17–May 10.)	5	0			
			Jackson county: Leon township..... (Feb. 20–June 1.)	85	0			
			Jackson county: Napoleon township.... (Mar. 1–May 30.)	25	0			
			Rives township..... (Mar. 23–Apr. 17.)	3	0			
			Rives township..... (Apr. 24–May 6.)	1	0			
			Jackson county: Spring Arbor township (Mar. 20–Apr. 3.)	2	0			
			Spring Arbor township (Apr. 8–Apr. 17.)	10	0			
			Tompkins township.... (Mar. 10–June.)	104	1			
			Kent county: Cannon township..... (Apr. 17–May 20.)	28	0			
			Livingston county: Hamburg township.... (Apr. —.)	1	0			
			Unadilla township..... (Apr. —.)	1	0			
			Hillsdale county: Somerset township.... (May 15–May 30.)	3	0			
			Jackson county: Spring Arbor township (Mar. 20–June 14.)	37	0			
Jackson county: Liberty township..... (Apr.—Aug.)	40	0	Jackson county: Parma township..... (Feb. 23 —.)	20	0	Jackson county: Hanover village..... (Apr. 29–May 4.)	1	0
Jackson county: Parma village..... (Feb. 10–June 11.)	51	1						
Jackson county: Sandstone township....	†	—						
Kalamazoo county: Climax township..... (Feb. 22–Apr. 8.)	35	0	Calhoun county: Battle Creek township (Mar. 13–Apr.)	10	0	St. Joseph county: Mendon township.... (June 3–July 17.) Three Rivers city... (Apr. —.)	2	0
			Le Roy township..... (Mar. 10–May 5.)	29	0			
Kalamazoo county: Schoolcraft..... (Feb. 16 —.)	10	0	St. Joseph county: Park township..... (Mar. 11–May 2.)	69	0			
			Kalamazoo county: Brady township..... (Mar. 6–June.)	25	1			
			Richland township.... (Feb. 20–June 5.)	4	0			
Kalamazoo county: Vicksburg village..... (Feb.—Apr.)	60	0	St. Joseph county: Leonidas township.... (Feb. 12–Apr. 8.)	2	0			

* From Waterloo Tp. measles was spread to Chelsea Vil., Washtenaw Co., 1 case.

† This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Kalkaska county: Rapid River township.. (— Aug.)	6	0	Kalkaska county: Orange township..... (May-Sept. 25.)	6	0			
Lake county: Luther village	*	—	Lake county: Chase township.....	3	0			
Lapeer county: North Branch.....	*	—	Lapeer county: Imlay City village (June 24-July.)	2	0			
			Calhoun county: Marengo township..... (Apr. 30 —.)	1	0			
			Lenawee county: Adrian township..... (Mar. 6-Apr. 15.)	6	0			
			Dover township..... (Mar. 4-June 1.)	57	2			
Lenawee county: Adrian city..... (1896-June.)	799	2	Lenawee county: Madison township..... (Feb. 8-Aug. 5.)	100	0	Lenawee county: Fairfield township... (Mar. 18-Mar. 27.)	2	0
			Raisin township	3	0			
			Tecumseh village	90	0			
			Tecumseh township..... (Apr. 24-July 31.)	17	0			
			Monroe county: Bedford township..... (Feb. 19-Apr. 23.)	10	0			
Lenawee county: Seneca township.....	*	—	Lenawee county: Dover township..... (Feb. 22-Mar. 23.)	2	0			
Livingston county: Brighton township.....	25	0	Livingston county: Brighton village..... (Apr. 1 —.)	1	0			
Livingston county: Howell village..... (Apr. —.)	200	1	Livingston county: Iosco township..... (— May 21.)	25	0			
			Unadilla township..... (Apr. —.)	1	0			
Livingston county: Oceola township.....	97	2	Livingston county: Brighton village.....	1	0			
Livingston county: Tyrone township..... (May 1-May 9.)	10	0	Genesee county: Fenton village..... (May 15 —.)	1	0	Oakland county: Highland township... (Jan. 22 —.)	1	0
Macomb county: New Haven village ..	*	—	Shiawassee county: Hazleton township.... (Feb. 14-May 29.)	7	0			
			Venice township..... (Feb. 21-Mar. 15.)	4	0			
Macomb county: Romeo village.....	*	—	Lapeer county: Almont township..... (Aug. 12-Aug. 30.)	2	0			
Manistee county: Manistee city.....	*	—	Benzie county: Crystal Lake township (Nov. 10 Dec. 30.)	115	0			
Marquette county: Ispheming city..... (1896-Apr.)	450	1	Marquette county: Champion township... (Feb.-Feb. 26.)	4	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Mecosta county: Big Rapids city.....	50	0	Mecosta county: Grant township..... (Apr. —.)	5	0			
			Grant township..... (Nov.-Dec.)	11	0			
			Mecosta township..... (June 20-Aug. 13.)	29	0			
Midland county: Larkin township.....	*		Midland county: Homer township..... (May-July 14.)	22	0			
Midland county: Midland township.....	3	0	Midland county: Lincoln township..... (May 7-Aug.)	68	0			
Midland county.....			Oceana county: Hart village..... (May 4-May 9.)	1	0			
Montcalm county: Lakeview village.....	*		Kent county: Sand Lake village..... (Aug. 6-Aug. 17.)	8	0			
Montcalm county: Montcalm township....	*		Montcalm county: Sidney township..... (Apr. 27-July 20.)	35	0			
Montmorency county: Hillman village..... (Jan.-Apr. 10.)	50	0	Montmorency county: Rust township..... (Jan.-Feb. 27)	42	0			
Newaygo county: Ensley township..... (July 15-Aug. 1.)	1	0	Montcalm county: Pierson township..... (Sept. 4-Sept. 14.)	1	1			
Newaygo county: White Cloud village.... (Sept. 10-Dec. 28.)	84	0	Newaygo county: Big Prairie township.., (Dec. 10-Jan. 20, 1898.)	6	0			
			Everett township..... (Dec. 2-Dec. 30.)	7	0			
			Wilcox township..... (Oct.-Dec.)	3	0			
Oakland county: Clarkston village.....	*		Oakland county: Waterford township.., (Feb. 1-Mar. 10.)	53	0			
Oakland county: Farmington township.., (Feb. 14-May 14.)	190	0	Oakland county: Novi township..... (Feb. 17-Mar. 10.)	1	0			
Oakland county: Holly village..... (1896 —.)	1	0	Oakland county: Highland township.... (Jan.-June.)	149	0	Oakland county: Milford township.... (Mar.-Apr. 30.)	37	0
			Oakland county: Groveland township.... (Jan. 10-Mar. 28.)	55	0			
Oakland county: Lyon township..... (May 1-June 21.)	50	1	Livingston county: Green Oak township.., (Feb. 1-Mar. 10.)	25	0	Livingston county: Brighton village....	1	0
Oakland county: Oxford village..... (Feb.-Mar. 20.)	120	1	Oakland county: Addison township..... (Mar. 10-June 20.)	29	0	Oakland county: Leonard village+.... (Mar. 10-May 23.)	26	0
						Oakland county: Oakland township.., (June 1-June 20.)	8	0

* This foot-note is on the bottom of the first page of this table.

† From Leonard Vil. measles was spread to Dryden Tp., Lapeer Co., 3 cases.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Oakland county: Oxford village..... (Feb.-Mar. 20.)	120	1	Oakland county: Oxford township..... (Feb. 23—.)	1	0	Lapeer county: Hadley township.... May 3-June 10.)	2	0
Oakland county: Rochester village..... (Apr.-July.)	50	1	Lapeer county: Dryden township..... (Mar. 2-Mar. 15.)	5	0			
Oceana county: Shelby village..... (Dec. 7-Jan., 1898.)	57	0	Oakland county: Avon township..... (Apr. 3 Aug.)	52	1			
Ogemaw county: West Branch.....	200	1	Oceana county: Grant township..... (Dec. 20 Apr. 10, 1898.)	133	1			
Osceola county: Evart village.....	*		Ogemaw county: Elacking township.... (Oct.-Jan., 1898.)	100	0			
Osceola county: Highland township.... (1896 Mar. 12.)	35	3	Osceola county: Sylvan township..... (Feb.-Apr. 27.)	27	3			
Oscoda county: Mentor township.....	*		Osceola county: Sherman township.... (Jan. 1-Feb. 16.)	63	0			
Ottawa county: Wright township.....	*		Oscoda county: Big Creek township... (Aug. 4-Sept. 1)	4	0			
Saginaw county: Brant township..... (May 3-Sept.)	6	0	Kent county: Lisbon village..... (May-July 24.)	5	0			
Saginaw county: Saginaw city..... (1896-Sept.)	601	3	Saginaw county: Fremont township.... (July 17-Aug. 7.)	1	0	Genesee county: Flushing township.. (Apr. 15—.)	1	0
			Genesee county: Flushing villages..... (Apr.-June 30.)	80	0	Shiawassee county: Venice township.... (May 15-June 8.)	2	0
			Lapeer county: Lapeer city..... (Dec. 1-Dec. 27.)	1	0			
			Saginaw county: Fremont township.... (Feb. 13-Mar. 13.)	3	0			
			Tuscola county: Ellington township... (Apr. 8-Aug. 16.)	96	0			
Saginaw county: Swan Creek township..	*		Saginaw county: Brant township..... (Apr. 29-May 12)	1	0			
Sanilac county: Argyle township.....	*		Sanilac county: Austin township..... July 13-Aug. 6.)	3	0			
Sanilac county.....			Macomb county: Richmond township... (Nov. 20-Jan. 25, 1898.)	3	0			
Shiawassee county: Corunna city..... (Feb. 4-Mar. 28.)	142	2	Clinton county: Ovid village..... (Apr. 1—.)	150	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Shiawassee county: Corunna city..... (Feb. 4-Mar. 25.)	142	2	Genesee county: Flint township..... (Mar. 8-May 12.)	7	0			
			Shiawassee county: Venice township..... (Mar. 25-Apr. 6.)	3	0			
Shiawassee county: Durand village..... (Jan. 4-May 1.)	31	1	Shiawassee county: Venice township..... (Jan.-Jan. 25.)	2	0			
Shiawassee county: Hazleton township..... (Feb. 14-May 29.)	7	0	Genesee county: Flushing village..... (Feb.-Mar. 6.)	2	0	Isabella county: Broomfield township (Apr.-June.)	35	0
						Denver township.... (Apr. 12-May 18.)	7	0
			Isabella county: Mt. Pleasant city..... (Feb. 20-July 15.)	236	0	Union township..... (Apr. 3-.)	10	0
Shiawassee county: Owosso city..... (Jan. 1 Mar. 20.)	602	0	Shiawassee county: Fairfield township.... (Feb. 18-Apr. 10.)	18	0	Missaukee county: McBain village..... (May 4-May 27.)	4	0
			Morrice village..... (Feb.-Apr. 5.)	57	0			
St. Clair county: Port Huron city..... (1896-Aug. 24.)	232	0	St. Clair county: Grant township..... (June 28-Aug. 6.)	15	0			
St. Clair county: Riley township.....	*		St. Clair county: Wales township..... (Dec.-Mar. 15, 1898.)	65	0			
St. Clair county.....			Macomb county: Armada township..... (Nov. 10-Dec. 8.)	5	0			
St. Joseph county: Elmwood township.....	*		Tuscola county: Ellington township....	1	0			
						Cass county: Newberg township.... (Apr. 16-June.)	10	0
						St. Joseph county: Centreville village.. (May 24-June.)	4	0
St. Joseph county: Fabius township..... (Apr.-June.)	20	0	St. Joseph county: Three Rivers city..... (Apr. 10-Aug. 17.)	394	2	Constantine village. (Apr. 19-June 16.)	5	0
						Fawn River Tp..... (June 1-July 11.)	18	0
						Leonidas township. (Apr. 23-.)	4	0
						Lockport township. (Apr. 26-June 25.)	38	1
St. Joseph county: Mendon village..... (July 27-Aug. 20.)	6	0	St. Joseph county: Leonidas township.... (Aug. 5-Sept. 15.)	14	0	Mottville township. (Aug. 6-Sept. 15.)	6	0
						Park township..... (Aug. 1-Aug. 20.)	2	0
Tuscola county: Mayville village.....	3	0	Tuscola county: Fremont township.... (Apr. 3-Apr. 20.)	15	0	White Pigeon Vil... (Aug. 4-.)	1	0
			Watertown township. (Mar. 27-May 4.)	6	0			
Van Buren county: Gobleville village..... (Mar.-July.)	10	0	Van Buren county: South Haven village.. (May 14-June 6.)	9	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Washtenaw county: Ann Arbor city.....	*		Washtenaw county: Northfield township..... (Mar. 15-July 30.)	199	0	Washtenaw county: Salem township..... (Apr. 20 —.)	2	0
Washtenaw county: Sylvan township.....	*		Washtenaw county: Lima township..... (Apr. 8-July 10.)	4	0			
			Livingston county: Hamburg township..... (— May.)	1	0			
			Monroe county: Bedford township.....	1	0			
Washtenaw county: Ypsilanti city..... (Feb. 27 —.)	27	0	St. Joseph county: Colon township..... (Apr. 5-Apr. 12.)	2	0			
			Washtenaw county: Augusta township..... (July 10-July 20.)	5	0			
			Northfield township..... (Mar. 10 —.)	1	0			
			Clinton county: Maple Rapids village..... (Mar. 1-Mar. 17.)	1	0			
			Huron county: Fair Haven township..... (Feb. 14-Mar. 7.)	3	0			
			Sheridan township..... (Jan.-Apr. 1.)	17	0			
			Ingham county: Stockbridge village..... (Jan. 18-Mar. 15.)	30	0	Ingham county: Stockbridge tp..... (Feb. 2-Mar. 1.)	6	0
			Lenawee county: Adrian township..... (Jan. 15-Feb.)	75	0			
			Macomb county: Sterling township..... (Jan.-Mar. 1.)	60	0	Oakland county: Troy township..... (Feb. 17-May 20.)	12	1
Wayne county: Detroit city..... (Jan. 2-June.)	590	17	Oakland county: Independence tp.....	15	0			
			Sanilac county: Marlette village..... (Mar.-Apr.)	6	0			
			St. Clair county: East China township..... (Mar. 6 —.)	15	0			
			Washtenaw county: Chelsea village..... (Jan. —.)	3	1			
			Salem township..... (Mar. 31 —.)	93	0			
			Wayne county: Monguagon township..... (Feb. 19-Mar. 20.)	36	0			
			Plymouth village..... (Jan. 29-May 28.)	44	0			
			Taylor township..... (Feb. 3-Apr. 20)	27	1			

* This foot-note is on the bottom of the first page of this table.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Wayne county: Greenfield township.....	15	0	Wayne county: Highland Park village. (Feb.-Mar. 10.)	7	0			
Wayne county: Plymouth village..... (Jan. 29-May 28.)	41	0	Washtenaw county: Salem township..... (Apr. 4—.)	1	0			
Wayne county.....			Barry county: Carlton township..... (Mar. 18-June 10.)	91	1			
			Charlevoix county: Bay township..... (May 5-June.)	50	0	Charlevoix county: Haves township... (June-June.)	11	0
Southern part of State.			Bozoyne village..... (May-June.)	3	0			
			Gratiot county: Arcada township..... (Apr. 25-May 8.)	1	0			

Movement of infection of Measles into Michigan from outside the State.

						Allegan county: Otsego village..... (June 5-July 15.)	4	0
						Valley township..... (June 21-July 25.)	1	0
						Emmet county: Petoskey city..... (May 21—.)	1	0
						Gratiot county: Ithaca village..... (Nov. 29-Dec. 10.)	1	0
						Ionia county: Campbell township.. (Apr. 21—.)	1	0
						Kent county: Byron township..... (Mar. 24-Aug. 25.)	10	0
Chicago.....			Kent county: Grand Rapids..... (Jan. 18-Jan. 4, 1898.)	4,862	17	Cannon township..... (Nov. 17-Jan. 22, '98.)	15	0
						Paris township..... (May 8-July 16.)	6	0
						Rockford village..... (June 9-July 29.)	4	0
						Walker township..... (May 1-Aug. 15.)	28	0
						Muskegon county: Muskegon city*..... (July 1-July 15.)	2	0
						Oceana county: Hart village†..... (May 21-Aug. 17.)	32	0
						Ottawa county: Georgetown tp..... (July 1-July 31.)	3	0
						Wexford county: Cadillac city..... (June-July 17.)	10	0

* From Muskegon city measles was spread to Grand Haven city, Ottawa Co., 2 cases.

† From Hart Vil. to Hart Tp., Oceana Co., 1 case, and to Elbridge Tp., Oceana Co., 3 cases.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles into Michigan from outside the State.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Chicago.....			Berrien county: Bertrand township.... (Apr. 26-May 1.)	1	0			
			Oceana county: Hart village..... (May —.)	1	0			
			Van Buren county: Lawrence village..... (May 26 —.)	1	0			
Colorado.....			Allegan county: Casco township..... (Apr. 12-Apr. 30.)	3	0	Calhoun county: Newton township... (Feb. 1-Apr.)	49	0
Illinois: Elgin.....			Berrien county: Lake township..... (Apr. 1-June.)	20	0			
Indiana: Bruce's Lake.....			Berrien county: Coloma village..... (Nov. 22-Apr. 11, 1898.)	36	0			
Indiana: Elkhart.....			St. Joseph county: White Pigeon village.. (Apr. 1-Apr. 10.)	1	0			
Indiana: Greenfield.....			Branch county: Noble township..... (May 1 —.)	1	0			
Indiana: New Carlisle.....			Berrien county: Gallen village..... (Mar. 6-June 3.)	4	0			
Indiana: Valparaiso.....			Calhoun county: Fredonia township..... (Jan. 16-Feb. 5, 1898.)	150	0			
Indiana: Wabash.....			St. Joseph county: Leonidas township..... (Feb. 2-Feb. 20.)	1	0			
			Newaygo county: White Cloud village.... (May 17-June 11.)	6	0			
			Berrien county: Benton Harbor city.... (Mar. 13-Mar. 22.)	1	0			
Indiana.....			Branch county: Bronson township..... (Jan. 18-Apr. 1.)	35	0	Branch county: Batavia township.... (Mar. 10 —.)	2	0
			St. Joseph county: Burr Oak village..... (May 17-June 30.)	8	0	Bethel township..... (Mar. 11-June 15.)	186	0
			Lenawee county: Bis-field township..... (Apr. 20-May 20.)	12	0	Coldwater city*.... (Mar. 10-Aug. 19.)	361	1
Ohio: Toledo.....			Cambridge township.. (Apr. 20-June 20.)	40	0	Lenawee county: Fairfield township... (Jan. 29-June 1.)	101	1
			Osden township..... (Jan. 8-May 1.)	24	0			
			Livingston county: Fowlerville village.... (Jan. 12 —.)	1	0			

* From Coldwater city measles was spread to Ovid Tp., Branch Co., 11 cases. From Coldwater to Kalkaska Vil., Kalkaska Co., 3 cases. From Coldwater city to Colon Tp., St. Joseph Co., 2 cases.

TABLE 7.—CONTINUED.—*Movement of Infection of Measles into Michigan from outside the State.*

First Location from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Ontario.....			St. Clair county: St. Clair city..... (Dec.-Mar. 16, 1898.)	327	0	Livingston county: Hartland township*.....	75	0
Pennsylvania.....			Kent county: Cascade township..... (Mar. 1-Mar. 10.)	1	0	St. Clair county: Kimball township.... (Dec.-Apr., 1898.)	36	0
Wisconsin.....			Clinton county: Lebanon township..... (June 3-June 30.)	6	0			
Probable Movement of Infection of Measles.								
Antrim county: Bellaire village..... (— Oct 15)	3	0	Antrim county: Central Lake village.... (June-Dec.)	308	1			
Calhoun county: Albion city..... (Mar. 14-Feb. 24, 1898.)	445	0	Jackson county: Concord township..... (Nov. 30-Dec. 10.)	5	0			
Calhoun county: Battle Creek city..... (Jan. 12-Nov. 7.)	67	0	Calhoun county: Tekonsha township.... (Feb. 15-Mar. 28.)	300	0			
Clinton county: Ovid township.....	4	0	Clinton county: Victor township..... (Jan. 1-Mar.)	40	1			
Clinton county.....			Montcalm county: Edmore village..... (Apr. 14-May 4.)	2	1			
Eaton county: Charlotte city..... (— Dec. 31.)	300	1	Eaton county: Bellevue village..... (May 3-July 20.)	85	0			
Genesee county: Gaines township.....	20	0	Livingston county: Deerfield township....	1	0			
Genesee county: Linden village.....	27	0	Livingston county: Deerfield township.... (Mar.-Apr. 30.)	150	0			
Gratiot county: St. Louis city..... (June-Dec. 20.)	67	0	Isabella county: Coe township..... (Dec. 14-Mar. 30, 1898.)	64	1			
Hillsdale county: Hillsdale city..... (Apr. 4-Aug.)	659	1	Hillsdale county: Cambria township..... (Apr.-July.)	12	0			
Iosco county: Au Sable..... (Jan-June.)	50	0	Sanilac county: Forestville village..... (May 15-June 5.)	4	0			
Jackson county: Jackson city..... (Feb.-May.)	400	3	Eaton county: Eaton township.....	6	0			
Kent county: Grand Rapids city..... (Jan. 18-June 4.)	4,868	17	Ingham county: Leslie village.....	40	0			
			Ottawa county: Jamestown township.... (Apr. —.)	160	0			

* From Hartland Tp. measles was spread to Brighton Vil., Livingston Co., 57 cases. From Brighton Vil., to Hamburg Tp., Livingston Co., 55 cases.

TABLE 7.—CONCLUDED.—*Probable Movement of Infection of Measles.*

First Localities from which Measles was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Livingston county: Stockbridge village.....	*	—	Livingston county: Unadilla township..... (Apr. 2-June 20.)	38	0			
Oakland county: Oakland township..... (June 1-June 20.)	8	0	Shiawassee county: Fairfield township..... (— June 18.)	1	0			
Saginaw county: Chesaning village..... (Apr. —.)	42	0	Saginaw county: Brant township..... (May-Sept.)	6	0			
Shiawassee county: Owosso city..... (Jan. 1-Mar. 20.)	602	0	Shiawassee county: Corunna city..... (Feb. 14-Mar. 28.)	142	2			
Van Buren county: Bloomington village.....	*	—	Berrien county: Coloma village..... (June 21-Sept. 12.)	5	0			
Washtenaw county: Ann Arbor city.....	*	—	Schoolcraft county: Hiawatha township..... (Apr. 15-June 5.)	17	0			
			Lapeer county: Lapeer township..... (Feb. 25-Mar. 10.)	1	0			
Wayne county: Detroit city..... (Jan. 2-June.)	590	17	Montcalm county: Eureka township..... (Apr.-June 12.)	30	0			
			Wayne county: Livonia township..... (Feb. 8 —.)	13	1			
			Van Buren township..... (Mar. 15-July 10.)	42	0			
Probable Movement of Infection of Measles into Michigan from outside the State.								
Canada.....			Emmet county: Littlefield township..... (May 12-Sept. 9.)	89	1	Emmet county: Springvale tp..... (Oct.-Dec. 10.)	20	0
Indiana.....			Berrien county: Weesaw township..... (Feb. 25 —.)	1	0			

* This foot-note is on the bottom of the first page of this table.

NEGLECT OF MEASURES TO RESTRICT MEASLES, VIOLATION OF PUBLIC HEALTH LAWS, ETC.

Of 32,543 reported cases of measles in only 112 cases were isolation and disinfection thoroughly carried out. (Table 8.) The reports of health officers throughout the State show that the great difficulty experienced in restricting this disease lies in the mistaken idea, so generally prevalent, that measles is not to be dreaded in childhood, but, rather, to be sought. And in mild cases no physician is employed, no reports made, and, consequently, no efforts made to prevent its spread. Many health officers state that their compensation is not sufficient to allow them to seek out all neglected cases, fumigate premises, and bring the offenders to justice. While in many instances this disease is very mild in character, there are

many who suffer from sequelæ of the disease. Aside from the trouble and suffering caused by so many cases of sickness from this disease, statistics show that the mortality from it warrants vigorous means for the prevention of its spread.

The State Board of Health, by its systems of wide-spread education, is making earnest efforts to instruct the people generally as to the character of this disease, that it is a dangerous communicable disease, and, as such, can be restricted.

Action of Detroit Board of Health in Regard to Restricting Measles.

From January 2, 1897, to June, 1897, there were reported to this office 590 cases of measles and 17 deaths from this disease in the city of Detroit.

January 8, 1897, Dr. Samuel P. Duffield, health officer of Detroit, wrote to Secretary Baker as follows:

"We have been trying to placard measles in this city in accordance with the so-called State law. I understand it is not done in outside townships and villages. Will you give me the law in full in which the State Board claim the right to placard measles? The physicians here are all mad about it and complaining, and say it is unjust, etc. I want the law in full and a copy of the action of the State Board and an opinion of the Attorney General as to what the penalty will be and whether the parties can be prosecuted under the law. I know if we come to a jury trial we will be beaten. And there are people who have never had a physician and never reported, and what are you going to do with them? The whole thing will come up for discussion in our medical societies as soon as we hear from you."

Secretary Baker replied, January 14, 1897, to Dr. Duffield's letter as follows:

"Your letter of Jan. 8, was received in due time, and has been carefully studied with the view of asking the opinion of the Attorney General as your letter requests. On attempting to frame the letter to the Attorney General the laws are so plain that there seems to be no question to submit to him. After receiving this letter and studying the laws which this points out, if you still wish for an opinion by the Attorney General, kindly send me a letter covering the exact questions you wish submitted and I will place the subject before him.

"Replying now to the other portion of your letter, the law under which this office claims that it is the duty of every health officer and local board of health to 'give public notice of infected places by placard on the premises, and otherwise if necessary,' is section one of act 137, laws of 1883, also section 1673, Howell's Statutes, which reads as follows: 'When the smallpox, or any other disease dangerous to the public health, is found to exist in any township, the board of health shall use all possible care to prevent the spreading of the infection, and to give public notice of infected places to travelers, by such means as in their judgment shall be most effectual for the common safety.' This act is worded to apply to 'any township,' but section 1681 says 'The provisions of this chapter, and the amendments thereto, shall, as far as applicable, apply to all cities and villages in this State, and all duties which are, by the provisions of this chapter, to be performed by the board of health of townships, or by the officers and inhabitants thereof, shall in like manner be performed by the board of health and the officers and inhabitants of such cities and villages, with a like penalty for the non-performance of such duties, excepting in cases where the charters of such cities and villages contain provisions inconsistent herewith.' I think that nothing in the charter of the city of Detroit is 'inconsistent' with section 1673, which I have copied above.

"The foregoing makes it plain that the health officer and local board of health are required to give public notice of infected places. This is best done by a placard on the premises. This is required in every 'disease dangerous to the public health.' That measles is a 'disease dangerous to the public health' there can be no doubt. Every intelligent sanitarian knows that in England one of the most important 'diseases dangerous to the public health' is measles. The statistics of the office of the Secretary of State in this State demonstrate that the number of deaths from measles very greatly exceeds the number of deaths from smallpox. The statistics in the office of the State Board of Health prove that measles is a 'disease dangerous to the public health.' The State Board of Health has formally declared and published that measles is a 'disease dangerous to the public health' under the law in Michigan. The laws and facts are so plain that it seems to me that there can be no question as to the duty of every health officer and board of health in Michigan to take active measures for the restriction of measles.

"As to the prosecution, under the law, of those who fail to report measles, the law is exceedingly plain. Section 1675, Howell's Statutes, as amended by act 158, laws of 1895, requires every householder to report any 'disease dangerous to the public health' in writing to the health officer. Section 1676, Howell's Statutes, as amended by act 158, laws of

1895, requires every physician to report any 'disease dangerous to the public health' to the local health officer. Section 1634, Howell's Statutes, makes it the duty of every health officer of a city to give notice to the prosecuting attorney of the county of any failure in a householder or physician to report a case of 'disease dangerous to the public health.' (It is provided in section 1675, Howell's Statutes, that householders are relieved from the duty of reporting if a physician in attendance has given to the health officer an immediate notice of the case.) Section 8442, Howell's Statutes, requires the prosecuting attorney to prosecute for any forfeiture within his county. This completes the chain of action, and if local officers comply with these laws, measles will be reported and restricted or the penalties will be inflicted.

"If this office can be of any further service to you in this connection, it will give me pleasure.

"Herewith I send you printed marked copies of these laws and statements, all of which are to be found in our pamphlets Nos. 120 and 176."

Following is copy of further correspondence between this office and Dr. Duffield on this subject:

OFFICE OF THE BOARD OF HEALTH,
Detroit, January 21, 1897.

HENRY B. BAKER, M. D., *Sec'y State Board of Health:*

Dear Sir—I would like you to ask the Attorney General the following questions:

Suppose I bring action on certain physicians for not reporting measles as required by the State Board of Health, and they call for a trial by jury, and other physicians called as experts testify that in their opinion measles is not a disease dangerous to the public health, and we were beaten, as we will be under these circumstances, how are we then to proceed? Also can we ask and get from the city extra appropriations for measles, as we had not calculated for an epidemic of measles or quarantining them and supporting the families during quarantine when we received our appropriation. We are fighting against odds in this matter, and the State Board of Health ought to come out boldly in the papers and maintain their position if they expect the local health officers to enforce the law. I am doing all I can in the matter, but it would be easier work if the State Board would make it plain, not by inference, that measles is on a par with scarlatina—they should not merely infer the matter that *because* measles is a contagious disease therefore it is to be classed with diphtheria and scarlet fever and therefore must be quarantined. I am satisfied that your State Board by not coming out, and saying in resolution that measles (mentioning it with diphtheria), is a dangerous disease to the public health and giving the opinion of the Attorney General on the subject, would aid local health officers. I find the "measles" question a great deal harder to handle than the diphtheria—because the State Board have sprung this suddenly upon local health officers, and many of them are not paying attention to the law.

Yours, etc.,

SAMUEL P. DUFFIELD, M. D.
Health Officer.

OFFICE OF THE SECRETARY, }
Lansing, Jan. 23, 1897.

SAMUEL P. DUFFIELD, M. D., *Health Officer of the City, Detroit, Michigan:*

Dear Doctor—Your questions in your letter of Jan. 21, will go to the Attorney General, on your request. However, I think that your proposition might be changed to read as follows:—

"Suppose I as health officer of a city, give notice to the prosecuting attorney, as required by section 1634, Howell's Statutes, that a certain physician has not reported measles as the law requires—section 1676, Howell's Statutes, as amended by act 158, laws of 1895—and that physician calls for a trial by jury, and other physicians testify that in their opinion measles is not a 'disease dangerous to the public health,' how are we then to proceed?" While waiting for the opinion of the Attorney General, permit me to say that my advice would be to have placed upon the witness stand the city Health Officer, or some other well-known sanitarian, or some physician of high standing, who should be sworn and testify that the State law in Michigan provides for a State Board of Health which is charged by law with the supervision of the interests of life and health of the citizens of Michigan, that the State Board of Health of Michigan is good authority on the subject of "diseases dangerous to the public health"; that this is recognized not only in Michigan but throughout the United States, that on this subject in Michigan the State Board of Health is the highest authority provided for by law; that since about May, 1890, the Michigan State Board of Health has continuously published to the citizens of Michigan its deliberate conclusion that measles is a "disease dangerous to the public health," under the State law; that in recent years the Michigan State Board of Health has been publishing the results of compliance with and of disobedience of State laws for the restriction of measles, and that those results prove that whereas in those localities where restriction according to law and the instructions of the State Board of Health is neglected, there occur, on the average, many times as many cases as in localities where such restrictive measures are enforced, and that in every tenth locality where restriction is neglected a death results, while in localities in which restrictive measures are enforced very few cases occur, and no death results; thus the judgment of the State Board of Health that measles is a "disease dangerous to the public health" and that it can be restricted by compliance with State laws and the instructions issued by the State Board of Health has been amply verified by the statistics of actual experience in many localities in Michigan.

I think that no intelligent, honest and self-respecting physician in Michigan, who has given the subject attention, will testify that measles is not a "disease dangerous to the

public health." If he does so testify, it ought not to be difficult to demonstrate to a jury, by incontrovertible facts, that he is mistaken. By this mail I send you a copy of the "Sixth Edition" of our leaflet No. (176) on the Restriction and Prevention of Measles, and a diagram, "Plate 84," which leaflet and diagram contain evidence which, when properly explained, ought to convince any intelligent jury that measles is a "disease dangerous to the public health," under the Michigan laws.

While waiting for the opinion of the Attorney General, I trust that you will not relax your efforts for the restriction of measles.

Whether or not you can obtain from your city officials money appropriations for the restriction of measles I can form no opinion.

I notice with surprise your expression that "The State Board has sprung this suddenly upon local health officials." It seems to me that this would not have been a proper charge in 1890, and that the several years which have elapsed since then, during which the State Board has continued to distribute its leaflet publication on this subject should at this late date relieve this Board from any such charge as the one you make. The "Sixth Edition" of 20,000 copies was published in March, 1896, and most of the thousands of copies have been sent to local health officers *for distribution to the neighbors of infected premises*. The failure of your office to distribute these leaflets, as also our leaflets on the other dangerous diseases, to the neighbors of infected premises, must be the reason for your belief that this measure was "sprung suddenly." It is probably also the reason why you do not have the co-operation of the physicians and citizens of Detroit. That is the reason you are "fighting against odds in this matter." You cannot restrict measles until you do have the co-operation of your physicians and householders. You cannot get that co-operation until they see good reasons why, which they will not see unless you have placed those reasons before them at such a time as they are interested in the subject. When a house is placarded "*Measles*," some of the neighbors will read a short publication on the subject of measles. If published by the State Board of Health, some will read it who would not otherwise. The State-Board-of-Health plan of education, if thoroughly carried on, will eventually make it easy to restrict any such "disease dangerous to the public health." Again I plead with you to enter upon that method of work, with reference to measles, and every other "disease dangerous to the public health."

Very truly,

HENRY B. BAKER,
Secretary.

P.S.—You say "The State Board of Health ought to come out boldly in the papers and maintain their position if they expect the local health officers to enforce the law." I agree to this, and see no objection to the publication of this correspondence, certainly not if it shall attract attention to the proper measures for the restriction of measles and of other diseases of much more consequence than measles.

Very respectfully,

H. B. B.,
Sec.

STATE OF MICHIGAN,
Attorney General's Office,
Lansing, Jan. 29, 1897. }

SAMUEL P. DUFFIELD, M. D., *Health Officer of the City of Detroit, Michigan:*

My Dear Sir—Yours of January 21st, directed to Doctor Baker, in which you ask him to submit to me a hypothetical question, as to what course should be adopted by you in efforts made to suppress the epidemic of measles which, I understand, is now prevailing in your city, has been duly considered. I regard the question submitted as one which hardly comes within the range of the duties of my department.—The question seems to hinge largely on the question as to whether, as a matter of fact, measles is a dangerous contagious disease. That question is a question of medicine and not of law. The law is, "whenever any householder, hotel keeper, keeper of a boarding house, or tenant shall know or shall be informed by a physician, or shall have reason to believe that any person in his family," etc., is sick with smallpox, cholera, diphtheria, scarlet fever, or any other disease dangerous to the public health, he shall immediately give notice in writing thereof to the Health Officer of the township, city or village in which he resides.

The highest medical authority which I recognize in this State on such subjects is the Michigan State Board of Health,—and that Board has determined that measles is a dangerous contagious disease; hence a disease dangerous to the public health, under the laws of Michigan. It follows, that the requirements of the law compelling local boards of health to act, when informed of the existence of a contagious disease in their community dangerous to the public health, should be observed in the case of measles as in other cases.

If the machinery of the law is inadequate, or appropriations have not been made by the Legislature sufficient to carry out the requirements of the law, that is an obstacle for which local boards are in no way responsible. It is their duty to do the best they can, under the circumstances, and do what they can and all they can to obey the law.

Yours respectfully,

FRED A. MAYNARD,
Attorney General.

Report Relative to Measles in Detroit, Made at Meeting April 9, 1897.

To the President and Members of the State Board of Health:

Gentlemen—By invitation of the Detroit Board of Health, your Secretary visited Detroit February 3 to meet with that Board and the "Advisory Council," which consists of about thirty prominent physicians.

The subject for conference was the restriction of measles.

Very little time was available for preparation, and the precise phase of the question under consideration by the physicians and by the local board was not known to me until the meeting occurred. However, some of the reasons why measles is known to be a disease dangerous to the public health, were put before the meeting, the evidence, including diagrams exhibiting some of the statistics collected by the State Board of Health and by the Secretary of State. These diagrams demonstrated the fact that the deaths from measles in Michigan greatly exceed in number the deaths from smallpox, that a large proportion of all the deaths are of children, that the per cent of deaths to inhabitants is much greater among children than among adults, being five per ten thousand inhabitants at ages under five years, that the ratio of deaths to cases of the disease is greatest in the first year of life, and is not as great at any succeeding age until the age of forty years is reached—that is to say, until a good portion of the usual period of productive industry is past, that in those localities in Michigan in which isolation and disinfection are enforced in measles the average cases are less by sixty per outbreak than in those localities in which those measures are not enforced, that the common idea of the people that measles cannot be restricted is thus demonstrated to be incorrect, and that the common idea that it is best to have measles in childhood is not correct. The deaths reported by the Detroit Health Officer as having occurred in Detroit from measles during the five years ending with 1894 averaged 22 per year. The cases of sickness were not reported. If the disease was not more fatal than elsewhere about the State there were at least 2,200 cases of sickness. Your Secretary urged that these 2,200 cases of sickness and the 22 deaths per year in Detroit were not necessary, and ought not to be permitted to continue to occur.

Many physicians spoke, some claiming that measles could not be restricted because it spreads in the early stages before the disease can be diagnosed, some that the disease is dangerous to life in children, some that it is dangerous to life in adults, most of them agreeing that under present circumstances in Detroit it is impracticable to isolate all infected persons and things, for the reason that the epidemic is too general, many employ no physician, and do not understand the necessity of reporting the presence of the disease, many disregard the requirements for notification, isolation and disinfection, because these measures interfere with their incomes, for wages or sales.

Nothing new to members of this Board was mentioned by any speaker. From their statements the conditions are practically the same in Detroit as have been reported from nearly all of the fifteen hundred other jurisdictions in Michigan; yet one speaker was sufficiently narrow in his view and ignorant of the State, as a whole, as to suggest that your Secretary could not know, appreciate or understand the "peculiar" conditions existing in Detroit. The "peculiar" conditions mentioned were such as have been reported to the office of this Board many hundreds of times.

Dr. Theo. McGraw offered resolutions as follows:

"Resolved, That it is the sense of this meeting that measles is not a dangerous disease to the extent that there should be a quarantine; and, be it further

"Resolved, That a placard is all that is necessary and that the action of the board of health in handling the disease is all that it should be."

Apparently, the reason why by some physicians measles is not considered a "disease dangerous to the public health" is because there are so many cases of the disease. If during the five years ending with 1894 there had been no cases except the 22 each year which proved fatal, probably all the physicians would consider measles a dangerous disease. Many physicians seem not to realize that one function of the Health Service of the State is to lessen not only deaths, but the sickness from preventable diseases. The evidence collected by the State Board of Health is to the effect that measles is a preventable disease. It follows that with proper effort the 22 deaths and the 2,200 cases of measles in Detroit in each year may be prevented.

Respectfully submitted,
HENRY B. BAKER.

Estimated Number of Outbreaks and Cases of Measles Prevented and Lives Saved by Isolation and Disinfection.

Tables 8 and 9 and the following diagram compare the average numbers of cases and deaths in outbreaks of measles where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 9 it

*In the compilation of the reports for Tables 8 and 9, and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed

may be seen that during the eight years, 1890-97, there were about 25 times as many cases per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced; and that while there were nearly five-tenths of one death per outbreak where restrictive measures were neglected, no deaths occurred where those measures were enforced.

By Table 8 it may be seen that during the year 1897 there were reported to the office of the State Board of Health 766 outbreaks of measles, with 26,458 cases and 147 deaths.† Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 44,099 cases and 237 deaths, and taking from these respectively the cases (26,458) and deaths (147) which did occur, leaves 17,641 cases and 90 deaths indicated as prevented in these 766 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 3,196 outbreaks which occurred during the eight years, 1890-97, is 109,246 cases and 857 lives. This is shown in Table 9.

in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

†*Definition of Outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak. Possibly the sixty-day limit may, at some future time, be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area. Also, comparisons of years require that outbreaks be counted as closed, at the end of the year; while in comparing outbreaks for testing the value of isolation and disinfection it is necessary to take complete outbreaks, even where they extend from one year into the next. This explains any apparent discrepancy between the numbers of outbreaks, cases and deaths here given and the numbers given at the beginning of this article.

TABLE 8.—Measles in Michigan in 1897: Exhibiting the Average Numbers of Cases and Deaths per Outbreak;—(1) in all the 766 outbreaks reported; (2) in the 313 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 3 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 31 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 14 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 35 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 324 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 46 outbreaks in which Isolation and Disinfection were both enforced.

	(1) All outbreaks. (766 outbreaks.)*		(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (313 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (3 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (31 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (14 outbreaks.)		(6) Isolation enforced—Disinfection neglected. (35 outbreaks.)		(7) Isolation and Disinfection both neglected. (324 outbreaks.)		(8) Isolation and Disinfection both enforced. (46 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals.....	26,458	147	7,027	14	18	0	232	1	290	1	126	0	18,053	101	112	0
Averages	34.54	.19	22.45	.14	6.00	0	7.48	.03	20.71	.07	3.60	0	457.57	4.31	42.43	.40

* Outbreaks in Grand Rapids and Kalamazoo are not included because of the difficulty of determining the beginning and ending of an outbreak in these cities in which the disease was present in some part of the city nearly all the time.

† These figures are graphically represented in the diagram opposite this page, entitled "Isolation and Disinfection restricted Measles in Michigan in 1897."

TABLE 9.—*Exhibiting for the eight years, and for each of the eight years 1890-97, the numbers of Reported Outbreaks, Cases and Deaths from Measles; also for this eight-year Period, the average number of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection or both were doubtful; Isolation and Disinfection both Neglected; Isolation and Disinfection both Enforced; and, also, the Numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

Years.	All Outbreaks.*				Isolation or Disinfection, or both not mentioned, or Statements Doubtful.				Isolation and Disinfection Neglected.				Isolation and Disinfection Enforced.				Cases and Deaths Indicated as having been Prevented by Isolation and Disinfection†			
	Outbreaks.	Cases.	Deaths.		Outbreaks.	Cases.	Deaths.		Outbreaks.	Cases.	Deaths.		Outbreaks.	Cases.	Deaths.		Cases.	Deaths.		
1890.....	419	11,189	103		353	6,326	59		57	4,819	44		6	19	0		24,233	220		
1891.....	392	12,338	118		309	6,492	59		71	5,920	63		11	27	0		20,347	231		
1892.....	236	4,406	67		187	2,427	45		31	1,953	22		7	8	0		10,462	101		
1893.....	357	5,440	71		238	2,569	53		70	2,681	14		10	24	0		8,223	0		
1894.....	358	7,345	49		246	4,160	42		70	2,971	7		13	32	0		7,849	0		
1895.....	269	4,462	13		152	2,660	7		56	1,563	6		25	72	0		3,043	14		
1896.....	399	17,068	158		177	4,178	26		146	12,626	131		21	54	0		17,438	201		
1897.....	766	26,458	147		313	7,027	44		324	18,653	101		46	112	0		17,641	90		
Totals for the eight years, 1890-97.....	3,196	88,706	726		1,975	35,809	335		825	51,186	488		139	348	0		109,246	4857		
Annual averages for the eight years, 1890-97.	400	11,088	91		247	4,484	42		103	6,398	49		17	44	0		13,697	97		
Average cases and deaths per outbreak, 1890-97.....	.....	27.76	.23		.....	18.16	.17		.....	62.04	.47		.....	2.50	0		.....	.....

* Outbreaks in Detroit, Grand Rapids and a few other localities, where the disease was present throughout the whole year, are not included, owing to the difficulty in determining the beginning and ending of an outbreak in those localities. The localities which are thus excluded in 1897 are given in a foot-note to Table 8 of this article, and for previous years, in foot-notes to tables similar to Tables 9 and 10 of this article in articles on measles for those years.

† The numbers of cases and deaths in this double column are found by multiplying "All Outbreaks" for each year by the average number of cases or deaths per outbreak, in those outbreaks in which isolation and disinfection both were neglected, for that year, to learn the number that would have occurred if efforts for the restriction of the disease had not been made. The instances in which isolation and disinfection were enforced are still so few that the evidence is not yet very satisfactory. The totals of the columns representing cases and deaths are based on two distinct methods of solution, which are explained as follows:—(1) the 109,246 cases and 4857 deaths are totals of the average numbers of cases and deaths per outbreak for the eight years, 1890-97 (62.04 and .47 where isolation and disinfection were neglected) by the total number of outbreaks to which would have occurred if all outbreaks had been neglected, and subtracting therefrom the numbers of cases and deaths that were reported as having occurred during the eight-year period.

*Period of Incubation in Measles.*TABLE 10.—*Exhibiting the reported period of Incubation, stated in days, in 181 instances of Measles.—Compiled from reports of Health Officers in Michigan for the year 1897.*

Incubation period— days-----	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	30
Cases in each period...	*1	†2	3	‡3	9	§25	¶49	||7	**11	5	††26	4	‡‡2	3	1	4	§§5	1

*In this instance it was reported as about 4 days.

†In this instance it was reported as about 5 days.

‡In 6 instances it was reported as about 7 days.

§In 12 instances it was reported as about 9 days.

¶In 16 instances it was reported as about 10 days.

||In this instance it was reported as about 11 days.

**In this instance it was reported as about 12 days.

††In 14 instances it was reported as about 14 days.

‡‡In 1 instance it was reported as about 15 days.

§§In 3 instances it was reported as about 21 days.

The average of the above 181 reported periods of incubation is 11 days.

TABLE 11.—*Exhibiting, relative to 151 instances of Measles in Michigan in 1897, the Reported Period of Incubation, within certain limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Instances.	Days.	Means.	Instances.	Days.	Means.	Instances.	Days.	Means.	Instances.	Days.	Means.
1	1 to 14	7	3	6 to 10	8	6	7 to 21	14	1	9 to 18	13.5
4	1 to 21	11	2	6 to 12	8.5	1	7 to 28	17.5	1	9 to 20	14.5
2	2 to 3	2.5	1	6 to 13	9.5	1	8 to 9	8.5	6	9 to 21	15
1	2 to 14	8	1	6 to 14	10	6	8 to 10	9.0	1	9 to 28	18.5
2	3 to 10	6.5	1	6 to 18	12	1	8 to 11	9.5	2	10 to 12	11
1	4 to 10	7	1	7 to 9	8	5	8 to 12	10	13	10 to 14	12
1	4 to 20	12	10	7 to 10	8.5	1	8 to 14	11	2	10 to 15	12.5
1	5 to 6	5.5	1	7 to 11	9	1	8 to 15	11.5	1	10 to 17	13.5
1	5 to 9	7	2	7 to 12	9.5	1	8 to 18	13	1	10 to 18	14
1	5 to 10	7.5	16	7 to 14	10.5	1	8 to 20	14	4	10 to 20	15
1	5 to 14	9.5	3	7 to 15	11	1	8 to 25	16.5	1	10 to 21	15.5
1	5 to 15	10	1	7 to 16	11.5	1	9 to 13	11	2	12 to 14	13
2	5 to 20	12.5	1	7 to 18	12.5	14	9 to 14	11.5	1	13 to 22	17.5
2	5 to 21	13	7	7 to 20	13.5	2	9 to 15	12	1	14 to 21	17.5
									1	19 to 21	20

The average of all the means for the 151 instances is 11.3 days.

*Ages of Greatest Prevalence of, and Mortality from Measles.**

The reports of local health officers in Michigan, for the year 1897, stated the ages of 9,844 persons who were sick with measles, and of 54 persons who died of that disease.

By Table 12 it may be seen that the greatest proportion of cases of measles was of children under 10 years of age, 64.4 per cent of all cases having occurred in that age-period; that 24.5 per cent of cases were of persons from 10 to 20 years of age; and 11.2 per cent were of persons over 20 years of age.

TABLE 12.—*Exhibiting in certain Age-Groups, the number of Cases and the number of Deaths from Measles; the per cent that the cases in each group were of all cases of known ages; the per cent that the deaths in each group were of all deaths at known ages; and the per cent that the deaths in each group were of the cases in that group.—Compiled from all reports for the year 1897 which stated the ages.*

Ages in groups of years.	Number and per cent of Cases and Deaths in certain Age-groups.																		
	All ages known.	Under 1.	1.	2.	3.	4.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60 & over.
No. of cases.....	9,844	139	380	442	556	669	2,186	4,150	1,593	816	459	233	175	116	69	21	10	6	10
Per cent the cases in each group were of all cases of known ages.....	100	2.4	6.5	7.6	9.5	11.5	22.2	42.2	16.2	8.3	4.7	2.4	1.8	1.2	.7	.2	.1	.1	.1
No. of deaths.....	54	12	10	3	4	2	31	4	4	4	2	3	1	1	2	1	1	0	0
Per cent the deaths in each group were of cases in that group.	.5	8.6	2.6	.7	.7	.3	1.4	.1	.3	.5	.4	1.3	.6	.9	3.0	4.8	10.0	0	0
Per cent the deaths in each group were of all deaths, at known ages.....	100	22.2	18.5	5.6	7.4	3.7	57.4	7.4	7.4	7.4	3.7	5.6	1.9	1.9	3.7	1.9	1.9	0	0
Per cent the deaths in special groups were of all deaths, known ages.....		5.4						22.2					20.4						

*In compiling data relative to ages, used in tables in this article, each age-period begins and ends on the birthday. For arranging the ages by single years or in age-periods the following method is pursued:—From birth to one year old is under one year. Those one year old and less than two years old are classed in the first year. The second year of age includes all persons over two years and less than three years of age, and so on for each succeeding year.

In dividing the ages into five-year periods, the first period includes all ages from birth to five years, or all under five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.

†Does not include those cases or deaths where the age was not stated.

In 1897 the greatest proportion of deaths from measles was reported to have occurred in children under 5 years of age, 57.4 per cent of all deaths having occurred in that age-period; 22.2 per cent of deaths occurred in the age-period from 5-20 years.

There are two erroneous and very harmful beliefs, quite prevalent among parents,—that measles cannot ultimately be escaped any more than teething, and that the least dangerous time for persons to have the disease is while quite young children. Whatever ground there may be for these beliefs elsewhere, Table 8 and the diagram illustrative of it, and Tables 12 and 13 of this article show that none exists in Michigan; but that on the contrary, facts here bear evidence that measles is a preventable disease; and that it is *more* fatal to young children than to persons in the middle ages.

TABLE 13.—*Exhibiting, in certain Age-Groups, the number of Cases and the number of Deaths from Measles in the six years, and in each of the six years, 1892-97; the per cent that the Cases in each group were of all Cases; the per cent that the Deaths in each group were of all Deaths.—Compiled from all reports for the years 1892-97 which stated the ages.*

Year.		Total No. in- cluded.	Per Cent of Cases and Deaths in certain Age-groups.*														
			All ages.	Un- der 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.	
1892.	Cases	786	100	28.5	30.0	18.6	12.7	3.9	2.9	1.7	1.0	0.3	0.1	0	0.1	0.1	
	Deaths	34	100	41.2	44.1	5.9	0	2.9	2.9	0	0	0	0	0	2.9	0	
1893.	Cases	3,064	100	32.5	35.1	12.0	9.3	4.5	3.0	2.1	0.9	0.6	0.2	0.2	0.07	0.07	
	Deaths	22	100	41.0	13.6	9.1	4.5	4.5	9.1	9.1	0	4.5	0	0	0	4.5	
1894.	Cases	4,807	100	33.7	41.4	12.8	5.5	3.0	1.6	1.0	.6	.3	.3	.02	0	.04	
	Deaths	20	100	45.0	20.0	5.0	10.0	10.0	10.0	0	0	0	0	0	0	0	
1895.	Cases	1,172	100	19.5	40.1	18.3	9.3	5.2	3.2	1.6	1.2	.5	.5	.3	.3	0	
	Deaths	5	100	60.0	0	40.0	0	0	0	0	0	0	0	0	0	0	
1896.	Cases	5,355	100	29.4	46.7	13.7	4.7	2.6	1.2	.8	.5	.2	.2	.04	0	.1	
	Deaths	30	100	76.7	6.7	10.0	3.3	0	0	0	0	0	0	3.3	0	0	
1897.	Cases	9,844	100	22.2	42.2	16.2	8.3	4.7	2.4	1.8	1.2	.7	.2	.1	.1	.1	
	Deaths	54	100	57.4	7.4	7.4	7.4	3.7	5.6	1.9	1.9	3.7	1.9	1.9	0	0	
1892-97.	Cases	25,028	100	24.4	42.8	15.7	7.4	4.1	2.1	1.5	1.0	.5	.2	.1	.5	.1	
	Deaths	165	100	52.7	14.5	11.5	5.5	3.0	4.8	1.8	1.2	1.8	.6	1.2	0	1.2	

*The method of compiling ages in the years 1892, '93 and '94 is explained in foot-note on page 363 of the Annual Report of this Board for 1895. The method of compiling ages in the years, 1895-'97 is explained in foot-note under Table 12 of this Report.

On page 342 of the Annual Report of this Board for the year 1894 is given a diagram which graphically represents the figures in a table

similar to Table 13; showing for the two years, 1892-93, the per cent of deaths which occurred in each age-period.

TABLE 14.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Measles, in Michigan, during the years, 1893-97; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

Year.	Sex.	Average age of persons who recovered. Years.	No. of cases included.	Age.—In Periods of Years. Per cent of (non-fatal) Cases in each Period.*													
				All ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.
1893.	Males.	10.28	1,446	100	31.3	37.2	10.3	8.4	5.7	3.3	2.1	1.0	.5	.1	.07	0	.07
	Females..	10.22	1,596	100	33.5	33.6	12.5	10.2	3.4	2.8	2.1	.9	.6	.2	.3	.1	.06
1894.	Males.....	8.49	2,424	100	33.9	43.2	12.1	4.8	2.9	1.3	.7	.5	.3	.3	0	0	0
	Females..	9.04	2,363	100	33.4	39.7	13.5	6.1	3.0	1.7	1.3	.7	.3	.3	.04	0	.08
1895.	Males.....	9.90	579	100	21.6	41.6	13.7	6.6	5.2	2.4	1.9	.7	.7	.5	.2	0	0
	Females..	11.20	588	100	17.2	38.9	17.9	12.1	5.3	3.9	1.4	1.7	.3	.5	.3	.5	0
1896.	Males.....	7.73	2,650	100	28.8	48.1	13.5	4.3	2.8	.9	.7	.5	.2	0	.04	0	.2
	Females..	7.87	2,675	100	29.4	45.8	13.9	5.1	2.4	1.5	.8	.5	.3	.3	0	0	0
1897.	Males.....	9.8	4,946	100	21.7	42.8	15.9	8.6	4.9	2.7	1.5	1.1	.5	.2	.1	.1	.1
	Females..	9.9	4,844	100	22.4	41.8	16.6	8.0	4.4	2.0	2.0	1.3	.9	.2	.1	.04	.1
1893-97.	Males.....	9.2	12,045	100	26.9	43.3	14.0	6.8	4.2	2.1	1.3	.8	.4	.2	.1	.03	.1
	Females..	9.4	12,066	100	27.3	41.1	14.9	7.5	3.6	2.0	1.6	1.0	.5	.3	.1	.1	.1

*On a preceding page, a foot-note to the sub-head under which this table appears explains these age-groups.

Table 14 shows that of the 12,045 males reported to have recovered from measles in the years, 1893-97, of which the ages were stated, 43.3 per cent occurred in the age-period from 5 to 9 years, and 26.9 per cent occurred in children of under 5 years, 14 per cent occurred in the period from 10 to 14 years and from this age-period the per cent greatly decreased.

The percentages for females correspond closely with those for males.

TABLE 15.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups, who died of Measles during the years 1893-97.*

Year.	Sex.	Average age of decedents. Years.	No. of cases included.	Per Cent of Deaths in certain Age-groups.*											
				All ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 years and over.	
1893.	Males.....	11.2	10	100	60	10	0	10	0	10	0	0	0	0	
	Females.....	19.2	12	100	25	16.7	16.7		8.3	8.3	16.7	0	0	8.3	
1894.	Males.....	10.4	11	100	36	18	9	18	18	0	0	0	0	0	
	Females.....	9.7	9	100	56	22	0	0	0	22	0	0	0	0	
1895.	Males.....	8.5	2	100	50	0	50	0	0	0	0	0	0	0	
	Females.....	5.2	3	100	66	0	33	0	0	0	0	0	0	0	
1896.	Males.....	2.9	13	100	77	15	8	0	0	0	0	0	0	0	
	Females.....	6.4	17	100	77	0	12	6	0	0	0	0	0	6	
1897.	Males.....	8.8	20	100	55	10	10	10	5	5	0	0	5	0	
	Females.....	11.4	34	100	59	10	6	6	3	6	3	3	3	6	
1893-97.	Males.....	8.2	56	100	57.1	10.7	10.7	8.9	5.4	3.6	0	0	3.6	0	
	Females.....	11.0	75	100	57.3	6.7	9.3	5.3	2.7	5.3	4.0	2.7	1.3	5.3	

*On a preceding page, a foot-note to the sub-head under which this table appears exhibits these age-groups.

An exhibit showing by sex and in age-groups, the death-rates from measles in Michigan, during the 25 years, 1870-94 (as reported to the Secretary of State), can be found on page 267 of the Annual Report of this Board for the year 1896.

Case-Mortality Rates from Measles at the Different Ages.

EXHIBIT.—*In certain age-groups, the numbers of cases and deaths from measles in the eight years, 1890-97, and the per cent that the deaths in each group were of the cases in that group. (Compiled from all reports to the Secretary of the State Board of Health for the years, 1890-97 which stated the ages.)*

	Under 1.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.
Cases—1890-97.	399	7,326	12,632	4,911	2,400	1,334	651	474	305	164	79	24	13	15	10
Deaths—1890-97.	27	110	33	21	15	8	8	5	3	4	2	2	0	2	1
Per cent.....	6.8	1.5	.3	.4	.6	.6	1.2	1.1	1.0	2.4	2.5	8.3	0	13.3	10.0

Summarizing the above exhibit, for the eight years, 1890-97, the averages per year, at all ages, are: Cases, 3,792; deaths, 27; per cent the deaths are of the cases, 0.8.

TABLE 16.—*Exhibiting, by Sex, for each year of Age, and in certain Age-groups, the number of persons who died from Measles during the six years, 1892-97, and the per cent the deaths in each Age-group were of deaths at all ages. (Compiled from such reports to the State Board of Health as stated the sex and age.)*

Sex.	Ages in Years, and groups of years.	Number and per cent of Deaths by Sex, in certain Age-periods.*																														
		All Ages.	Under 5.					5-9.					10-14.					15-19.					20-29.					30 + and over.				
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		25	26	27	28	29
Males.	No. of Deaths, by single years.	----	7	16	4	4	6	3	4	2	4	1	3	0	2	0	3	1	1	1	1	1	0	1	1	1	1	1	2	1	0	2
	No. of Deaths, by Groups of Yrs. . .	73	37					14					8					5					7					2				
	Per cent the Deaths in each age-group were of the total deaths + among Males.	100	50.7					19.2					11.0					6.8					9.6					2.7				
	Average age at Death, from Measles.	8.2																														
	No. of Deaths, by single Years.	----	12	15	12	7	4	2	1	2	3	2	5	1	4	0	1	1	2	0	1	0	0	0	1	1	0	1	0	1	2	11
Females.	No. of Deaths, by Groups of Yrs. . .	92	50					10					11					4					6					11				
	Per cent the Deaths in each age-group were of the total deaths + among Females.	100	54.3					10.9					12.0					4.3					6.5					12.0				
	Average age at death, from Measles.	10.7																														
	No. of Deaths, by single Years.	----	19	31	16	11	10	5	5	4	7	3	8	1	6	0	4	2	3	1	2	1	0	1	2	2	1	1	2	2	2	13
	No. of Deaths, by Groups of Yrs. . .	165	87					24					19					9					13					13				
Both Sexes.	Per cent the Deaths in each age-group were of the total deaths + in both sexes.	100	52.7					14.5					11.5					5.5					7.9					7.9				
	Average age at Death, from Measles.	9.6																														

*On a preceding page, a foot-note to the sub-head under which this table appears explains these age-groups.

†Deaths from measles.

*Average Duration of Measles.—Fatal and Non-Fatal Cases.*TABLE 17.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from Measles, in Michigan, during the years, 1892-97. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Measles.										
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Deaths in each Period of Days.							
			All cases.	1 to 5.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 and over.
1892.	Males.....	4	100	25.0	50.0	0	25.0	0	0	0
	Females.....	7	100	14.3	14.3	42.9	14.3	0	0	14.3
1893.	Males.....	9	100	44.4	22.2	22.2	11.1	0	0	0
	Females.....	11	100	9.1	27.2	27.2	18.1	9.1	9.1	0
1894.	Males.....	9	100	33.3	33.3	11.1	11.1	11.1	0	0
	Females.....	6	100	33.3	33.3	16.6	16.6	0	0	0
1895.	Males.....	1	100	0	0	0	0	0	100.	0
	Females.....	3	100	0	33.3	33.3	33.3	0	0	0
1896.	Males.....	10	100	60.0	20.0	0	20.0	0	0	0
	Females.....	13	100	38.5	30.8	15.4	0	15.4	0	0
1897.	Males.....	16	100	37.5	43.8	6.3	6.3	0	6.3	0
	Females.....	23	100	21.7	30.4	34.8	4.3	4.3	0	4.3
1892-97.	Males.....	49	100	40.8	32.7	8.2	12.2	2.0	4.1	0
	Females.....	63	100	22.2	28.6	28.6	9.5	6.3	1.6	3.2

Table 17 shows that of the 49 males reported to have died from measles in the six years, 1892-7, of which the interval between the day of being taken sick and the day of death was given, 40.8 per cent died before the sixth day of sickness, and the per cent of deaths decreased in the succeeding five-day periods. Of the 63 females so reported the largest per cent (28.6) died in the second five-day period.

The average duration of fatal cases of measles in the years, 1892-7, was 8.9 days for males and 11.5 days for females.

Table 18 shows that of the 7,357 males who recovered from measles during the six years 1892-7, of which the interval between the day of being taken sick and the day of recovery was stated, 46.6 per cent recovered before the eleventh day of sickness, 88.1 per cent recovered before the sixteenth day of sickness. Of the 7,312 females so reported, 45.9 per cent recovered before the eleventh day of sickness, 88.6 per cent before the sixteenth day of sickness.

The average duration of non-fatal cases of measles in the years 1892-7 was 8.6 days for males and 11.6 days for females.

The average duration of non-fatal cases of measles in the years 1892-97 was 11.9 days for males and 11.8 days for females.

TABLE 18.—*Exhibiting, by Sex of patient, by per cent of cases which recovered in specified periods of time, the Duration (in days) of Non-Fatal cases of sickness from Measles, in Michigan, during the years, 1892-97. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-Fatal Cases of Measles.															
Year.	Sex.	No. of cases in- cluded.	Duration of Sickness:—Per Cent of Cases in each Period of Days.												
			All Peri- ods.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 days and over.
1892.	Males.....	259	100	6.6	59.8	18.9	10.8	1.5	1.2	.8	0	.4	0	0	0
	Females.....	259	100	8.1	56.0	15.8	14.3	2.7	1.6	.8	.4	0	.4	0	0
1893.	Males.....	620	100	12.1	45.0	25.3	9.7	3.5	1.6	1.0	1.0	.2	.2	.3	.3
	Females.....	654	100	13.9	49.7	22.2	7.5	2.8	1.9	.2	.9	.3	.5	0	.2
1894.	Males.....	823	100	5.0	46.8	23.6	17.4	4.9	.6	.4	.4	.2	.2	.2	.4
	Females.....	771	100	7.1	45.4	24.9	16.6	4.4	.3	.7	0	.1	.5	0	0
1895.	Males.....	338	100	9.8	49.4	26.3	7.4	3.3	.9	.3	1.8	.6	.3	0	0
	Females.....	321	100	8.7	51.4	26.8	6.5	4.4	.9	.3	.6	.3	0	0	0
1896.	Males.....	1,650	100	6.5	51.3	35.0	4.7	1.6	.7	.1	.1	0	0	0	0
	Females.....	1,675	100	7.4	49.8	34.1	5.3	2.0	.9	.3	.1	0	0	.1	0
1897.	Males.....	3,667	100	5.2	30.9	54.1	5.0	1.8	1.1	.7	.5	.4	.1	.1	.1
	Females.....	3,632	100	5.1	28.4	57.4	5.1	1.6	1.	.5	.4	.3	.1	0	.1
1892-97.	Males.....	7,357	100	6.3	40.3	41.5	7.1	2.3	1.	.5	.5	.3	.1	.1	.1
	Females.....	7,312	100	6.9	39.0	42.7	7.0	2.2	1.0	.5	.4	.2	.2	0	0

Proportion of Measles in the Different Months of the Year 1897.

Table 20 exhibits evidence, from two sources, on the proportion of measles reported in each month of the year 1897, namely, the sickness statistics and the contagious disease statistics. The *first* line states the per cent of all weekly postal-card reports, made by physicians in active general practice, which reported the presence of measles under their observation. The *second* line states the average per cent of all these reporters who stated the presence of measles. The *third* line states the average order of prevalence of measles in the list of diseases reported. The *fourth* line represents the *prevalence* of measles, according to the sickness statistics, being a combination of the first and third lines of this

table (the method of combining them is explained on pages 122-3 of the Annual Report of this Board for the year 1890). In this fourth line the smallest numbers indicate the greatest prevalence. For instance, May is 1 or *first* in prevalence,—more measles in May than in any other month; June is 2 or *second* in prevalence; April is 3 or *third* in prevalence; and so on. The *fifth* line represents by months the number of outbreaks of measles reported to this office by health officers and clerks, including only the reports which gave the dates of outbreaks,—reports of 53 outbreaks did not give dates and, of course, those outbreaks could not be included in this line.

The evidence of the sickness statistics, summarized in the fourth line of this table (20), indicates that the maximum prevalence of measles in Michigan in 1897 occurred in May, and the minimum in September. The fifth line of the table, which is based on the contagious-disease statistics, indicates that the maximum number of reported outbreaks occurred in April and the minimum in October. This evidence is only for a single year, and might, therefore, be exceptional. In Exhibit XX., page 139, of this Annual Report for 1898, is a statement of the average per cent of weekly card reports stating the presence of measles by months for the twenty years, 1877-96, from which it appears that the maximum occurs in May, and the minimum in October.

TABLE 20.—*Measles in Michigan during the year 1897, exhibiting, by months, the per cent of all weekly card-reports received which stated the presence of measles; the average per cent of all observers reporting weekly who reported measles; the average order of prevalence of measles where it was present; the prevalence of measles, according to the sickness statistics, and the number of outbreaks of measles reported by health officers and clerks of local boards of health.*

1897.	Year	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Per cent of weekly card reports stating presence of measles..	13	8	12	17	24	32	25	12	8	4	3	7	9
Average per cent of observers who reported measles present....	22	14	17	31	38	41	41	24	12	7	5	11	17
Average order of prevalence where present.	2.3	2.4	2.6	2.2	2.2	2.0	2.0	2.7	2.3	3.0	2.2	2.7	2.6
Prevalence*.....	(5)		8		3	1	2	9	5	12	6	11	10
Outbreaks†.....	692	60	77	95	129	88	72	34	26	19	17	33	42

*According to the sickness statistics, as explained in the text accompanying this table. In the fourth line of figures in this table, the smallest numbers indicate the greatest prevalence.

†The numbers in this line show the numbers of outbreaks which began in each month. There were 53 reported outbreaks in this year the dates of which were not given.

WHOOPIING-COUGH IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1897.

During the year ending December 31, 1897, there were reported to the Secretary of the State Board of Health, 246 outbreaks of whooping-cough in 238 localities in Michigan, which resulted in 3,978 cases and 72 deaths, with an average of 16.7 cases and .41 of one death per locality. The death-rate from this disease for the State in 1897, according to reports to this office, was 3.1 of one death per 100,000 inhabitants.

TABLE 1.—*Whooping-cough in Michigan for the eleven years, 1887-97: exhibiting the numbers of reported cases and deaths and the number of localities in which the presence of the disease was reported, together with the cases and deaths per locality and per 100,000 inhabitants, and the per cent the deaths were of cases. (Compiled from reports received at the office of the Secretary of the State Board of Health.)*

Years.	Cases.	Deaths.	Localities.	Cases per Locality.	Deaths per Locality.	Cases per 100,000 inhabitants.	Deaths per 100,000 inhabitants.	Per cent deaths were of Cases.
1887.....	2,267	59	162	16.	.36	115	3.	3.
1888.....	2,502	49	161	15.5	.3	124	2.4	2.
1889.....	2,694	41	139	19.	.3	131	2.	2.
1890.....	983	20	93	10.6	.2	47	1.	2.
1891.....	2,360	101	162	14.6	.6	111	5.	4.
1892.....	3,188	77	191	16.7	.4	147	3.5	2.
1893.....	4,047	134	214	18.9	.63	184	6.	3.
1894.....	4,555	123	241	18.9	.51	203	5.5	3.
1895.....	4,284	*109	240	17.9	.45	188	4.8	3.
1896.....	5,466	*91	281	19.5	.32	236	3.9	2.
1897.....	3,978	72	238	16.7	.30	169	3.1	2.
Av. for 11 years..	3,302	80	193	17.1	.41	140	3.4	2.

*In numerous instances only the fatal cases were reported to this office.

Whooping-cough in 1897, Compared with Previous Years.

Table 1 shows that in 1897 as compared with 1896 there was a large decrease in the sickness and mortality from whooping-cough; and that in 1897 as compared with the averages for the eleven years 1887-97, the cases, localities and sickness-rate were more; and that the deaths, the cases and deaths per locality, and the death-rate were less. The fatality—the per cent of cases which proved fatal—was the same.

TABLE 2.—*Exhibiting the Population of Michigan for the year 1897, by tiers of counties (Upper Peninsula as one tier); also the numbers of cases of, and deaths from, Whooping-cough REPORTED from each of the divisions for 1897, and the number of cases per 10,000 population of each division.*

Counties Grouped by tiers, most Northern Counties First.			Estimated population, 1897.*	Reported Cases of Whoop- ing-cough, 1897.	Reported Cases per 10,000 of Population.	Reported Deaths from Whooping- cough, 1897.	Reported Deaths per 10,000 of Population.
State.....			2,352,455	3,978	16.91	72	.31
Upper Penin- sula.....	Keweenaw. Houghton. Baraga. Marquette. Alger. Schoolcraft. Luce.	Chippewa. Gogebic. Iron. Dickinson. Menominee. Delta. Mackinac.	226,143	702	31.04	18	.80
Eleventh tier of counties...	Emmet. Charlevoix. Leelanaw.	Cheboygan. Presque Isle.	46,408	76	16.38	1	.22
Tenth tier of counties.....	Antrim. Otsego. Montmorency.	Alpena.	52,218	38	7.28	1	.19
Ninth tier of counties.....	Benzie. G'd.Traverse. Kalkaska. Manistee.	Crawford. Oscoda. Alcona.	46,497	197	42.37	4	.86
Eighth tier of counties.....	Wexford. Missaukee. Roscommon.	Ogemaw. Isco.	69,267	331	47.79	5	.72
Seventh tier of counties...	Mason. Lake. Osceola. Clare. Oceana.	Gladwin. Bay. Huron. Arenac.	164,859	475	28.81	3	.18
Sixth tier of counties.....	Newaygo. Mecosta. Isabella.	Midland.	95,459	104	10.89	0	0
Fifth tier of counties.....	Muskegon. Montcalm. Gratiot. Saginaw.	Tuscola. Sanilac.	251,793	369	14.65	3	.12
Fourth tier of counties.....	Ottawa. Kent. Ionia. Clinton.	Shiawassee. Genesee. Lapeer. St. Clair.	395,525	601	15.19	10	.25
Third tier of counties.....	Allegan. Barry. Eaton. Ingham.	Livingston. Oakland. Macomb.	233,901	297	12.70	5	.21
Second tier of counties...	Van Buren. Kalamazoo. Calhoun. Jackson.	Washtenaw. Wayne.	537,157	386	7.19	19	.35
First tier of counties.....	Berrien. Cass. St. Joseph. Branch.	Hillsdale. Lenawee. Monroe.	233,301	402	17.23	3	.13

*Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the office of the State Board of Health.

Distribution of Whooping-cough by Divisions of the State During 1897.

Table 2 exhibits the distribution of whooping-cough by divisions of the State, according to the reports made to the Secretary of the State Board of Health, during the year 1897. The table shows the reported numbers of cases and deaths, also the sickness and death-rates from whooping-cough, for each division.

Whooping-cough in Each Month of the Year, 1897.

TABLE 3.—*Exhibiting the reported number of outbreaks of Whooping-cough which were Present, in each Month of the Year 1897, in the different local jurisdictions of Michigan.*

Months.....	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Outbreaks present.....	21	31	32	34	37	40	56	41	39	40	53	57

TABLE 4.—*Reported Source of Contagium of Cases of Whooping-cough in 1897.*

Traced to a former case.....	633
Contagium reported as from outside jurisdiction.....	814
Contracted in school.....	48
Unknown or reports not definite (includes those reported "Contagium." "Sporadic," "Spontaneous," "De Novo," etc.).....	1,584
Not reported.....	899
All cases.....	3,978

Table 4 shows that relative to a large part of the reported cases of whooping-cough, the source of contagium was stated as unknown. This would seem to indicate that many cases existed which were not isolated, and by which other cases were infected.

Table 4 shows also that 633 cases of this disease were traced to infection from previous cases. It is probable that had precaution been taken to properly isolate first cases a large part of these 633 would have been prevented.

How Whooping-cough is Spread.

Physicians, health officers and the people generally are careless and negligent in restricting and reporting whooping-cough. This carelessness may be due to ignorance of the importance of whooping-cough as a cause of sickness and death. They may not know that this disease has, within the last few years, caused more deaths in Michigan than either scarlet fever, measles or small-pox. It should be constantly borne in mind by those concerned, that whooping-cough is a *communicable* and therefore a *preventable* disease, and not, as many persons believe, a normal physiological process which all children must pass through in their physical development.

TABLE 5.—*First, second and third localities, where the second locality was infected with Whooping-cough from the first, and the third was infected from the second; and numbers of cases and deaths from Whooping-cough in the first, second and third localities, with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

First Localities from which Whooping-cough was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Alcona county: Alcona township.....	*	---	Gladwin county: Bourett township..... (July 18-Aug.)	2	0			
Allegan county: Dorr township..... (Mar.-June.)	12	0	Kent county: Byron township..... (June 5-July 20.)	2	0			
Antrim county: Central Lake village...	*	---	Kalkaska county: Kalkaska village..... (July 12-Sept. 24.)	2	0			
Antrim county.....	---	---	Benzie county: Platte township..... (May-July.)	5	0			
Benzie county: Thompsonville village..	*	---	Newaygo county: Monroe township..... (Dec. 11-Feb. 26, 1898.)	10	0			
Berrien county: Benton Harbor city.... (Apr. 3-Oct. 30.)	27	0	{ Berrien county: Benton township..... (Dec. 1-Feb. 12, 1898.)	5	0			
			{ Royalton township.... (June 10-Oct. 10.)	10	0			
Berrien county: Niles city..... (June 15-Aug. 20.)	50	1	Berrien county: Niles township..... (July-Aug.)	8	1			
Branch county: Bronson village..... (Jan. 11-Mar.)	1	0	{ Branch county: Batavia township..... Bethel township..... (Feb. 8-Mar. 6.)	5	0			
				2	0			
Branch county: Quincy village.....	*	---	St. Joseph county: Burr Oak village..... (May 4-Aug. 24.)	14	0			
Clinton county: Ovid village.....	*	---	Hillsdale county: Litchfield township.... (Nov. 1.-Dec.)	4	0			
Grand Traverse county: Traverse City..... (May 5-June 25.)	3	1	{ Kalkaska county: Boardman township.... (—Mar. 20, 1898.)	50	0	Kalkaska county: Boardman village.... (May 31-Mar. 6, '98.)	50	0
			{ Orange township..... (May.-Aug.)	17	0			
Hillsdale county: Camden township.....	*	1	Hillsdale county: Amboy township..... (Nov. 2-Dec. 26.)	4	0			
Houghton county: Calumet township.....	42	1	Keweenaw county: Sherman township..... (Sept. 19-Jan. 23, 1898.)	32	1			
Huron county: Sebewaing township...	*	---	Huron county: Sebewaing village.... (Oct.-Dec. 24.)	4	0			
Ingham county: Williamston village....	3	0	Shiawassee county: Woodhull township.... (Jan. 16-Feb. 28.)	5	0			

*Whooping-cough was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 5.—CONTINUED.—*Movement of Infection of Whooping-cough.*

First Localities from which Whooping-cough was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Iosco county: East Tawas city.....	*	—	Iosco county: Wilber township..... (Sept. 8—.)	24	0			
Kalamazoo county: Vicksburg village.....	*	—	Jackson county: Concord village..... (Oct. 28-Dec. 6.)	1	0			
			Allegan county: Valley township..... (Jan.—July 10)	25	0			
Kent county: Grand Rapids city..... (Jan.—Dec. 22.)	205	1	Gratiot county: Ithaca village..... (Apr. 1-May 28.)	1	0			
			Wexford county: Cadillac city..... (Oct. 10-Feb. 9.)	50	1			
Keweenaw county: Grant township.....	*	—	Keweenaw county: Sherman township....	1	0			
Lapeer county: Marathon township....	3	0	Lapeer county: Oregon township.....	4	0			
Marquette county: Ishpeming city..... (1896-Dec.)	250	4	Marquette county: Ely township..... (June-Aug. 16.)	20	0			
Marquette county: Negaunee township....	*	—	Menominee county: Spaulding township.... (Nov. 9-Dec. 5)	3	0			
Mecosta county: Fork township..... (Dec.—Feb. 8, 1898.)	20	2	Mecosta county: Martiny township..... (Dec.—Apr. 1, 1898.)	11	0			
Midland county: Coleman village.....	*	—	Gladwin county: Gladwin city..... (July-March, 1898)	39	0			
Oakland county: Milford village.....	*	—	Oakland county: Milford township..... (Dec. 15-Apr. 30, 1898.)	16	1			
Oakland county: Oxford township.....	*	—	Oakland county: Addison township..... (Mar. 10-July 15.)	27	2	Oakland county: Leonard village..... (Mar.-May 31.)	30	0
Otsego county: Elmira township.....	3	0	Antrim county: Jordan township..... (Aug. 28-Sept.)	1	0			
			Bay county: Pinconning village..... (May-Mar., 1898.)	75	0			
Saginaw county.....	—	—	Pinconning township..	250	0			
			(—Mar. 15, 1898.)					
St. Clair county: Clyde township.....	*	—	St. Clair county: Grant township..... (Apr. 29-Aug. 10.)	38	0			
St. Joseph county: Sturgis city.....	*	—	St. Joseph county: Burr Oak township..... (July-Mar. 26, 1898.)	13	0			
Sanilac county.....	—	—	Tuscola county: Vassar township..... (Oct. 10-Dec. 24.)	50	0			

* This foot-note is on the bottom of the first page of this table.

TABLE 5.—CONCLUDED.—*Movement of Infection of Whooping-cough.*

First Localities from which Whooping-cough was spread.			Second Localities infected from First.			Third Localities infected from Second.		
Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.	Localities.	Cases.	Deaths.
Washtenaw county: Sylvan township.....	*	—	Washtenaw county: Lima township..... (Nov. 23-Dec. 25.)	3	0			
Wayne county: Detroit city..... (Jan.-Dec.)	45	11	Wayne county: Plymouth village..... (June 10-July 26.)	5	0			
Movement of Infection of Whooping-cough into Michigan from outside the State.								
Chicago.....	—	—	Ionia county: Ionia city..... (July 10—.)	1	0			
Illinois: Pullman.....	—	—	Cass county: Cassopolis village..... (Jan.—.)	100	1			
Wisconsin: Racine.....	—	—	Mackinac county: Mackinac village..... (—Sept.)	1	0			
Wisconsin.....	—	—	Arenac county: Moffitt township..... (July 10-Nov. 20.)	5	0			

* This foot-note is on the bottom of the first page of this table.

Comparisons are made in Table 6, of the average numbers of cases and deaths in outbreaks of whooping-cough where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in outbreaks where these measures were neglected.†

By Table 6 it may be seen that in those outbreaks relative to which the reports show that isolation and disinfection were neglected there were 25.87 cases of sickness and .34 of one death per outbreak.

In those outbreaks relative to which it was reported that restrictive measures were enforced, there were only 4.33 cases of sickness and .33 of one death per outbreak. Had no efforts at restriction been made, and had the average number of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both neglected" there would have occurred 6,028 cases of sickness and 79 deaths. If we deduct from these the 3,473 cases and 69 deaths which did occur we have a saving of 2,555 cases of sickness and 10 deaths as a probable result of the efforts made to restrict this disease.

†In the compilation of the reports for Table 6 showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or disinfection or both not mentioned, or statements doubtful."

Estimated Number of Outbreaks and Cases of Whooping-cough Prevented and Lives Saved by Isolation and Disinfection.

TABLE 6.—WHOOPIING-COUGH IN MICHIGAN IN 1897. — *Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 233 outbreaks reported; (2) in the 142 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 2 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 3 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 2 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 11 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 68 outbreaks in which Isolation and Disinfection were both enforced; (8) in the 6 outbreaks in which Isolation and Disinfection were both enforced.*

	(1) All outbreaks.* (233 outbreaks.)		(2) Isolation or Disinfection or both not mentioned, or statements doubtful. (142 outbreaks.)		(3) Disinfection enforced—Isolation doubtful. (2 outbreaks.)		(4) Isolation enforced—Disinfection doubtful. (2 outbreaks.)		(5) Disinfection enforced—Isolation neglected. (2 outbreaks.)		(6) Isolation enforced—Disinfection neglected. (11 outbreaks.)		(7) Isolation and Disinfection both neglected. (68 outbreaks.)		(8) Isolation and Disinfection both enforced. (6 outbreaks.)	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Totals.....	3,473	69	1,602	42	9	0	10	0	42	1	25	1	1,759	23	26	2
Averages.	14.91	0.30	11.28	0.30	4.50	0	5	0	21	0.5	2.27	0.09	25.87	0.34	4.33	0.33

* The numbers of outbreaks, cases and deaths given in Table 6 do not include those in Grand Rapids city and Calumet township because of the difficulty of determining the beginning and ending of an outbreak in those localities in which the disease was present in some part of the locality nearly all the time. Outbreaks, cases and deaths which were reported present in other localities in the calendar year 1897 are also omitted from Table 6 because the outbreaks began in 1896 and were included in a table similar to Table 6, and a diagram illustrative thereof, for that year.

*Period of Incubation in Whooping-cough.*TABLE 7.—*Exhibiting the reported period of Incubation, stated in days, in 25 instances of Whooping-cough. (Compiled from reports of Health Officers in Michigan, for the year 1897.)*

Incubation period—days.....	8	9	10	11	12	14	30
Instances in each period.....	*2	†2	‡6	§1	1	¶12	1

*In 1 of these instances it was reported as about 8 days.

†In 1 of these instances it was reported as about 9 days.

‡In 4 of these instances it was reported as about 10 days.

§In this instance it was reported as about 11 days.

¶In 8 of these instances it was reported as about 14 days.

The average period of incubation in the 25 instances reported is 12.5 days; the greatest number of instances given in any single period was in the 14 day period.

TABLE 8.—*Exhibiting, relative to 12 instances of Whooping-cough in Michigan in 1897, the Reported Period of Incubation, within certain limits, stated in days; also the Means, the Average of which may Represent the Average Period of Incubation.*

Days.	Means.	Days.	Means.	Days.	Means.	Days.	Means.
12 to 15	13.5	9 to 15	12	10 to 14	12	5 to 6	5.5
14 to 21	17.5	4 to 5	4.5	12 to 16	14	7 to 9	
6 to 14	10	8 to 20	14	7 to 21	14	8 to 10	9

The average of all the means, for the 12 instances, is 11.17 days.

*Ages of Greatest Prevalence of, and Mortality from, Whooping-cough.**

In Table 9 are shown the numbers of cases and deaths from whooping-cough in Michigan in 1897 in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in special groups were of all deaths.

*In compiling data relative to ages, used in tables in this article, each age-period begins and ends on the birthday. For arranging the ages by single years or in age-periods the following method is pursued:—From birth to one year old is the *first* year. Those one year old and less than two years old are classed in the second year. The third year of age includes all persons over two years and less than three years of age, and so on for each succeeding year.

In dividing the ages into five-year periods, the first period includes all ages from birth to five years, or all *under* five years of age. The second five-year period includes all ages of five years and over and less than ten years. In each succeeding period the same arrangement is followed.

TABLE 9.—*Exhibiting in certain Age-groups, the numbers of Cases and Deaths from Whooping-cough, the per cent that the cases in each group were of all Cases of Known Ages; the per cent that the Deaths in each group were of all Deaths at Known Ages; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1897, which stated the ages.*

Ages in groups of Years.	Number and per cent of Cases and Deaths in certain Age-groups.																
	All Known Ages.	0-1.	1-2.	2-3.	3-4.	4-5.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50 and over.
No. of cases.....	*573	36	45	46	58	52	237	225	67	28	6	5	2	0	1	0	2
Per cent the cases in each group were of all cases of Known ages.	100	6.3	7.9	8	10.1	9.1	41.4	39.2	11.7	4.9	1	.9	.3	0	.2	0	.3
No. of deaths.....	36	21	8	3	0	2	35	1	1	0	0	0	0	0	0	0	0
Per cent the deaths in each group were of all cases in that group.....	6.3	61.1	17.8	6.5	0	3.8	14.8	.4	1.5	0	0	0	0	0	0	0	0
Per cent the deaths in each group were of all deaths, Known ages..	100	58.3	22.2	8.3	0	5.6	97.2	2.8	2.8	0	0	0	0	0	0	0	0
Per cent the deaths in special groups were of all deaths Known ages		97.2						102.8									

*Does not include those cases and deaths where the age was not stated.

TABLE 10.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Whooping-cough, in Michigan, during the year 1897; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

1897.	Sex.	Average age of persons who re- covered. Years.	No. of cases in- cluded.	Age.—In Periods of Years. Per cent of (non-fatal) Cases in each Period.†														
				All ages.	Under five years.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 years and over.	
	Males.....	6.47	280	100	42.14	39.64	12.50	2.86	1.07	0.36	0.36	0	0.36	0	0	33	0.36	0
	Females..	6.44	293	100	40.61	38.91	10.92	6.83	1.02	1.37	0.34	0	0	0	0	0	0	0

†On a preceding page, a foot-note to the sub-head under which this table appears explains these age-groups.

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TABLE 11.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who Died of Whooping-cough during the year 1897.*

Year.	Sex.	Average age of decedents. Years.	No. of cases included.	Per Cent of Deaths in certain Age-groups.*							
				All Ages.	Under 5.	5 to 9.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.
1897.	Males.....	0.8	20	100	100	0	0	0	0	0	0
	Females.....	1.5	16	100	87.5	6.3	6.3	0	0	0	0

*On a preceding page, a foot-note to the sub-head under which this table appears explains these age-groups.

Average Duration of Whooping-cough.—Fatal and Non-fatal Cases.

TABLE 12.—*Exhibiting, by sex of patient, the duration (in days) of fatal cases of sickness from Whooping-cough, in Michigan, during the year 1897; arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Whooping-cough.											
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Deaths in each Period of Days.								
			All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 and over.
1897.	Males.....	11	100	9	0	18	27	0	9	27	9
	Females.....	10	100	40	20	20	0	10	0	10	0

TABLE 13.—*Exhibiting, by sex of patient, the duration (in days) of non-fatal cases of sickness from Whooping-cough, in Michigan, during the year 1897; arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-fatal cases of Whooping-cough.																
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Cases in each Period of Days.													
			All Periods.	1 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	61 to 65.	66 to 70.	71 to 75. and over.
1897.	Males.....	210	100	4	2	6	8	8	9	29	8	10	3	5	1	5
	Females.....	223	100	4	2	3	5	10	13	27	11	5	6	6	3	4

The average duration of fatal cases was in males 23.6 days and in females 10.1 days.

The average duration of non-fatal cases was in males 42.32 days and in females 43.32 days.

SMALLPOX (VARIOLA) IN MICHIGAN, IN 1897.

During the year ending December 31, 1897, there were reported to the Secretary of the State Board of Health 2 outbreaks of smallpox in 2 localities in Michigan which resulted in 15 cases with no deaths.

TABLE 1.—*Exhibiting, for each of the fourteen years, 1884-97, the number of reported Cases of, and Deaths from, Smallpox in Michigan; the number of localities where the disease was present, and the per cent of cases which proved fatal. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local health officers.)*

Years.	No. of localities.	Cases.	Deaths.	Deaths per 100 Cases.
1884.....	5	22	3	13.6
1885.....	9	27	6	22.2
1886.....	4	24	7	29.2
1887.....	2	4	0	0.0
1888.....	11	42	6	14.3
1889.....	14	57	4	7.0
1890.....	2	2	0	0.0
1891.....	3	3	0	0.0
1892.....	1	1	1	100.0
1893.....	2	10	3	30.0
1894.....	36	285	60	21.1
1895.....	21	187	47	25.1
1896.....	8	38	16	42.1
1897.....	2	15	0	0
Fourteen years.....	120	717	153	21.3

Of the two outbreaks mentioned in Table 1, as having occurred in 1897, one was in Bay City, resulting in four cases; the other was in Blissfield township, Lenawee county, and resulted in 11 cases.

Source of Contagium of Cases of Smallpox.

Of the 15 cases of smallpox reported during the year 1897, the local health officers reported the source of contagium as exhibited in the following table.

TABLE 2.—*Reported Source of Contagium of Cases of Smallpox, in 1897.*

Traced to a former case.....	14
Unknown	1
All cases.....	15

TABLE 3.—*Exhibiting, by Sex of patient, the per cent of cases which recovered in specified periods of time, the duration (in days) of Non-fatal cases of sickness from Smallpox in Michigan, during the years, 1894-7. Arranged in five-day groups. (Compiled from those reports which stated the length of time the patient was sick.)*

Non-fatal Cases of Smallpox.																
Year.	Sex.	No. of cases included.	Duration of Sickness:—Per Cent of Cases in each Period of Days.													
			All cases.	1 to 5 days.	6 to 10.	11 to 15.	16 to 20.	21 to 25.	26 to 30.	31 to 35.	36 to 40.	41 to 45.	46 to 50.	51 to 55.	56 to 60.	Over 60 days.
1894.	Males.....	40	100	7.5	7.5	12.5	15.0	10.0	12.5	15.0	0	5.0	7.5	0	5.0	2.5
	Females...	23	100	0	21.7	4.4	17.4	26.1	13.0	0	4.4	13.0	0	0	0	0
1895.	Males.....	36	100	0	5.6	16.7	11.1	22.2	13.9	16.7	5.6	2.8	2.8	0	2.8	0
	Females...	33	100	0	0	9.1	9.1	21.2	24.2	15.2	0	12.1	0	3.0	3.0	3.0
1896.	Males.....	7	100	14.3	14.3	71.4	0	0	0	0	0	0	0	0	0	0
	Females...	5	100	0	20	60	0	20	0	0	0	0	0	0	0	0
1897.	Males.....	1	100	0	0	100	0	0	0	0	0	0	0	0	0	0
	Females...	3	100	0	0	0	0	66.7	33.3	0	0	0	0	0	0	0

TABLE 4.—*Exhibiting in certain Age-groups, the number of Cases of Smallpox; and the per cent that the cases in each group were of all cases of known ages. (Compiled from all reports for the year 1897 which stated the ages.)*

Ages in groups of years.	Number and per cent of Cases in certain Age-groups.																
	All ages known.	Under 1.	1.	2.	3.	4.	Under 5.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.
No. of cases.....	15	1	1	0	1	2	5	2	2	2	2	0	0	0	1	0	1
Per cent the cases in each group were of all cases of known ages...	100.	6.7	6.7	0	6.7	13.3	33.3	13.3	13.3	13.3	13.3	0	0	0	6.7	0	6.7

CHICKEN-POX IN MICHIGAN IN 1897.

During the year ending December 31, 1897, reports relative to the existence of chicken-pox at seven localities in Michigan, which resulted in thirty-four cases of the disease and no deaths, were received at the office of the State Board of Health, as follows: Berrien Springs, Berrien county, 4 cases; Niles City, Berrien county, 1 case; Gibson Township, Bay county, 2 cases; Zeeland, Ottawa county, 20 cases; Portland Village, Ionia county, 4 cases; Lansing, Ingham county, 1 case; Coldwater, Branch county, 2 cases.

Details relative to the outbreaks in some of the above-mentioned localities will be found in the following extracts from correspondence of this office:

Chicken Pox in Saginaw, East Side.

November 8, 1897, Samuel Kitchen, M. D., Health Officer of Saginaw, East Side, wrote to this office as follows:

"Will you kindly inform me whether 'Varicella' is classed among contagious diseases and if it should be reported?"

November 9, 1897, in reply to Health Officer Kitchen's letter, the Secretary wrote as follows:

"Your postal relative to 'Varicella' is before me. While chicken-pox is not considered as a disease dangerous,* yet I think it should be reported to the local health officer and measures taken to prevent its spread, especially so when smallpox is present in the State, as it is now at Bay City, on account of the mistakes made sometimes in diagnosing smallpox as chicken-pox."

Chicken-Pox in Zeeland, Ottawa County.

December 21, 1897, the principal of the Zeeland public schools wrote as follows to the Secretary of this Board:

"We are having some difficulty in regard to the chicken-pox just now. I hold that all children are forbidden to attend school having the chicken-pox. Am I right? Some parents conceal the information from us and owing to that, we have many new cases spring upon us all at once. Will you send me the law about chicken-pox, and what is the duty of the health officer in the village or township? Who pays the doctor for investigating the case, and who calls him? If you will explain this fully to me I will try and impart the information and make it public. I sent home fifteen children today who had the chicken-pox. It has control of our lowest primaries."

December 22, the Secretary replied to Mr. Cogshall's letter as follows:

"While chicken-pox is not usually considered (as the phrase of the law expresses) 'disease dangerous to the public health,' yet I think it should be reported to the health officer, for two reasons: First, because of the mistakes made in diagnosing smallpox as chicken-pox, and second, because it is a communicable disease. There may be some doubt as to the legal authority of the health officer or local board of health, taking measures to restrict the disease, but I do not think there is any doubt but that the school board has a right to order the children having the disease to remain at home, as the board and officers of the school have a right to forbid anything that has a tendency to interfere with the work or welfare of the school."

*It is not a "disease dangerous to the public health."

Chicken-Pox in Gibson Township, Bay County.

December 13, 1897, Levi Soule of Gibson township wrote the following letter to this office:

"There has come to my knowledge a case of chicken-pox in school district No. 3, located in the township of Gibson, Bay county, and there are two cases now. If you please, I have notified the school board to close the school on Monday, December 12, so they did. Now, have I a right to do so? If so, please let me know at once, and if not, please let me know and send me a blank to fill out and send you."

December 16, 1897, Secretary Baker replied as follows to Health Officer Soule's letter:

"Relative to chicken-pox, it is not considered as a 'disease dangerous to the public health,' as the phrase is in the law, yet I think that it should be reported to the health officer and measures taken to restrict and prevent its spread, especially so whenever smallpox is present in the State, on account of the mistake sometimes made in taking precautions, for the reason that smallpox has recently been present in Bay City, and I think that you should procure the services of some physician who has had cases of smallpox to see these cases of chicken-pox, so there will be no question as to whether they are chicken-pox or smallpox. Relative to your ordering the school closed, I do not think that you have any power or right to do that. The law says you shall isolate all *sick* and *infected* persons so long as there is any danger of their communicating the disease, but the law does not contemplate the isolation of a whole community."

CONSUMPTION IN MICHIGAN—YEAR ENDING DECEMBER 31, 1897.

During the year ending December 31, 1897, there were reported to the Secretary of the State Board of Health 1,715 cases and 1,396 deaths from consumption in Michigan. These reports were received from 664 localities in the State. These numbers are probably less than the actual number of consumption infected localities in Michigan, much less than the actual number of deaths, and very much less than the actual number of cases. Many cases are of long duration, and in the early stages and sometimes in the latest stages are not under the care of a physician; as a consequence many of these cases are not reported. From many localities only the deaths from consumption are reported; therefore the apparent ratio of deaths to cases is much too high.

CONSUMPTION IN 1897, COMPARED WITH PREVIOUS YEARS.

According to the Reports made to the Secretary of the State Board of Health.

The compilation of information relative to the prevalence of consumption in Michigan, as reported to the office of the Secretary of the State Board of Health, was made for the first time for the year 1893. Table 1 shows the reported numbers of cases and deaths from consumption, the number of localities where the disease was reported present, the average numbers of cases and deaths per locality, and the deaths per 100 cases, for the years 1893-97.

TABLE 1.—CONSUMPTION IN MICHIGAN.—*Numbers of reported cases and deaths, number of localities in which they occurred, average number of cases and deaths per locality, and the per cent of cases which proved fatal, as reported for each of the five years, 1893-97.*

Year.	Reported localities.	Reported cases.	Average cases per locality.	Reported deaths.	Average deaths per locality.	Deaths per 100 cases.
1893.....	525	1,988	3.8	1,509	2.9	75.9
1894.....	590	2,060	3.5	1,581	2.7	76.7
1895.....	626	2,068	3.3	1,613	2.6	78.0
1896.....	512	2,198	4.3	1,454	2.8	66.2
1897.....	664	1,715	2.6	1,396	2.1	81.4

According to the reports made to the Secretary of State.

The reports to the Secretary of the State Board of Health, while useful for many purposes, are not yet useful for comparing the deaths in one year with the deaths in another year, for the reasons already stated. On the other hand, not all deaths are reported to the Secretary of State, but

probably the omissions are about the same in every year, therefore the statistics of the State Department are useful for comparing one year with another.

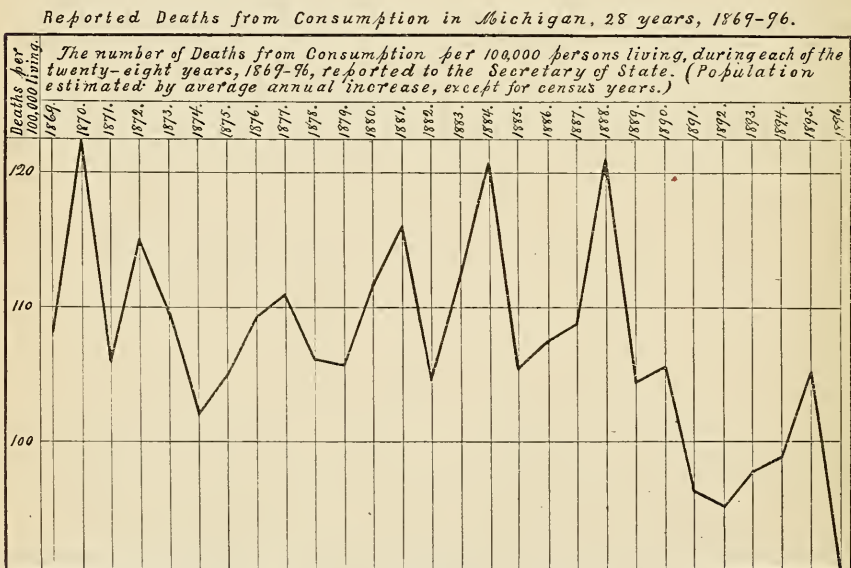
The following table (2) stating the number of deaths from consumption per 100,000 persons living, reported to the Secretary of State, probably quite accurately represents the annual fluctuations of, but not the total deaths from consumption in Michigan during the 28 years, 1869-96.

TABLE 2.*—*Exhibiting the number of reported deaths from Consumption per 100,000 persons living in Michigan in each of the 28 years, 1869-96. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population for intercensal years estimated by average annual increase based on National and State censuses.)*

Year.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
Deaths.....	108.1	122.5	106.0	115.1	109.6	102.0	104.9	109.2	110.9	106.1	105.6	111.7	116.1	104.4
Year.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Deaths.....	112.3	120.8	105.3	107.3	108.7	121.0	104.3	105.4	96.3	95.2	97.7	98.4	105.1	90.4

*This table and accompanying diagram do not show the number of reported deaths from consumption for the year 1897, because the reports to the Secretary of State for that year have not been compiled.

The accompanying diagram (Plate 937) graphically represents the figures contained in Table 2.



[PLATE 937.]

By Table 2, and more readily by the diagram—plate 937—it may be seen that there was a remarkable and unprecedented decrease in the

death-rate from consumption in Michigan in 1891, compared with any previous year; it was the first time that the disease had ever decreased so much, and the decrease occurred at a time when influenza was epidemic in this country, and the statistics for the Eastern States show an increase in the death-rate from consumption, which increase was attributed to the influence of the epidemic influenza.

It now seems probable that the decrease in the death-rate from consumption in Michigan beginning in 1891 and continuing since was due to the efforts of the State Board of Health to educate the people in methods of restricting the disease. Those efforts are mentioned on page 426, annual report of this board for 1895. Alternative suppositions are (1) that the decrease in the death-rate from consumption was caused by the attributing of a large number of deaths of consumptives to influenza, in the years 1891-2-3-4, and (2) that many who otherwise would have died from consumption in those years actually died from influenza, in 1891. Possibly all three of these supposed causes may have contributed. But it is a fact that the first edition of the leaflet on the restriction and prevention of consumption was widely distributed throughout Michigan in 1891, and that year was the first one in which the reported death-rate from consumption was less than 100 per 100,000 persons living; it is also a fact that in no year since 1890 has the reported death-rate from consumption equaled the average death-rate previous to that year; and in 1896 the reported death-rate from consumption was less than it was ever known to be in Michigan.

It now appears probable that the material lessening of the mortality from this disease which has heretofore caused most deaths has at last fairly commenced.

Sickness rates from reported Consumption in 1897.

Table 3 exhibits the distribution of reported sickness from consumption in Michigan in 1897 by tiers of counties, and the sickness-rate per 10,000 persons living in each tier. Table 4 shows the reported sickness and sickness-rates from consumption by counties in the State. For reasons explained in the first paragraph of this article little reliance can be placed on the completeness of the reports of *sickness* on which these sickness-rates are based.

Death-rates from reported Consumption in 1897.

Tables 3 and 4 show that the death-rate from consumption reported for the whole State in 1897 was 5.93 deaths per 10,000 persons living in the State.

The tier of counties having the highest reported death-rate (8.81 deaths per 10,000 population) was the tenth tier. The tier having the lowest reported death-rate (4.88) was the fifth. The county having the highest reported death-rate (14.75) was Alcona, that having the lowest reported death-rate (1.82) was Iron. From three counties—Baraga, Luce and Montmorency, no deaths from consumption were reported in 1897.

Probably this study of the death-rates is valuable, chiefly for its bearing upon the subject of the relative completeness of the reports from the different localities.

DISTRIBUTION OF CONSUMPTION BY DIVISIONS AND COUNTIES DURING 1897.

TABLE 3.—*Exhibiting the population of Michigan for the year 1897, by tiers of counties (Upper Peninsula as one tier); also the number of cases of and deaths from Consumption REPORTED to the State Board of Health from each of these divisions for 1897, and the number of cases and deaths per 10,000 population of each division.*

Counties in groups, most Northern ones first.			Estimated population, 1897.*	Reported cases of consumption, 1897.	Average reported cases per 10,000 population.	Reported deaths from consumption, 1897.	Reported deaths from consumption per 10,000 population.
State.....			2,352,455	1,715	7.29	1,396	5.93
Upper Peninsula.....	Alger. Delta. Schoolcraft. Luce. Houghton. Ontonagon. Gogebic. Baraga.	Mackinac. Chippewa. Keweenaw. Marquette. Iron. Menominee. Dickinson.	226,143	176	7.78	118	5.22
Eleventh tier of counties....	Emmet. Charlevoix. Leelanau.	Cheboygan. Presque Isle.	46,408	33	7.11	25	5.39
Tenth tier of counties....	Antrim. Otsego. Montmorency.	Alpena.	52,218	54	10.34	46	8.81
Ninth tier of counties....	Benzie. G'd Traverse. Kalkaska.	Crawford. Oscoda. Alcona.	46,497	34	7.31	26	5.59
Eighth tier of counties....	Manistee. Wexford. Missaukee. Roscommon.	Ogemaw. Iosco.	69,267	64	9.24	51	7.36
Seventh tier of counties....	Mason. Lake. Osceola. Clare.	Gladwin. Bay. Huron. Arenac.	164,859	133	8.07	120	7.28
Sixth tier of counties....	Oceana. Newaygo. Mecosta. Isabella.	Midland.	95,458	75	7.86	64	6.70
Fifth tier of counties....	Muskegon. Montcalm. Gratiot. Saginaw.	Tuscola. Sanilac.	251,793	148	5.88	123	4.88
Fourth tier of counties....	Ottawa. Kent. Ionia. Clinton.	Shiawassee. Genesee. Lapeer. St. Clair.	395,525	314	7.94	261	6.60
Third tier of counties....	Allegan. Barry. Eaton. Ingham.	Livingston. Oakland. Macomb.	233,901	196	8.38	142	6.07
Second tier of counties....	Van Buren. Kalamazoo. Calhoun. Jackson.	Washtenaw. Wayne.	537,157	303	5.64	272	5.06
First tier of counties....	Berrien. Cass. St. Joseph. Branch.	Hillsdale. Lenawee. Monroe.	233,301	185	7.93	148	6.34

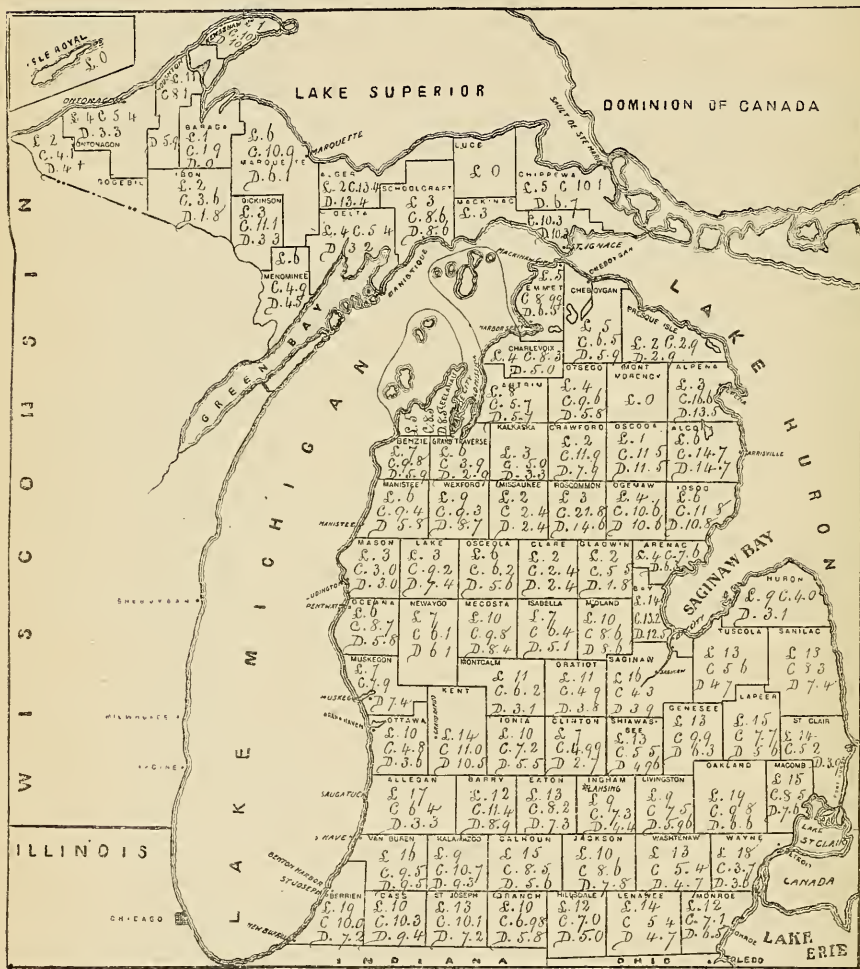
*Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the office of the State Board of Health.

TABLE 4.—Numbers of cases and deaths reported from **Consumption**; also the cases and deaths from that disease, per 10,000 persons living in each county in Michigan during the year 1897. (Compiled from reports of health officers, clerks, etc.)

Counties.	Estimated population for 1897.*	Number of reported		Number per 10,000 population, of		Counties.	Estimated population for 1897.*	Number of reported		Number per 10,000 population, of	
		Cases.	Deaths.	Cases.	Deaths.			Cases.	Deaths.	Cases.	Deaths.
State.....	2,352,455	1,715	1,396	7.29	5.93	Keweenaw.....	2,873	3	3	10.44	10.44
						Lake.....	5,441	5	4	9.19	7.35
Alcona.....	5,425	8	8	14.75	14.75	Lapeer.....	28,628	22	16	7.68	5.59
Alger.....	1,495	2	2	13.38	13.38	Leelanau.....	10,624	9	9	8.47	8.47
Allegan.....	39,360	25	13	6.35	3.30	Lenawee.....	48,611	26	23	5.35	4.73
Alpena.....	19,319	32	26	16.56	13.46	Livingston.....	20,121	15	12	7.45	5.96
Antrim.....	13,938	8	8	5.74	5.74	Luce.....	2,263	0	0	0	0
Arenac.....	7,888	6	5	7.61	6.34	Mackinac.....	6,792	7	7	10.31	10.31
Baraga.....	5,129	1	0	1.94	0	Macomb.....	32,818	28	25	8.53	7.62
Barry.....	23,636	28	21	11.42	8.88	Manistee.....	27,527	26	16	9.45	5.81
Bay.....	64,973	85	81	13.24	12.47	Marquette.....	39,454	43	24	10.90	6.08
Benzie.....	10,183	10	6	9.82	5.89	Mason.....	19,950	6	6	3.01	3.01
Berrien.....	48,898	49	35	10.00	7.16	Mecosta.....	21,503	21	18	9.77	8.37
Branch.....	25,769	18	15	6.98	5.82	Menominee.....	24,646	12	11	4.87	4.46
Calhoun.....	50,450	43	28	8.52	5.55	Midland.....	15,139	13	13	8.59	8.59
Cass.....	21,343	22	20	10.31	9.37	Missaukee.....	8,385	2	2	2.39	2.39
Charlevoix.....	12,012	10	6	8.33	5.00	Monroe.....	33,814	24	22	7.10	6.51
Cheboygan.....	15,336	10	9	6.52	5.87	Montcalm.....	35,299	22	11	6.23	3.12
Chippewa.....	17,799	18	12	10.11	6.74	Montmorency.....	3,151	0	0	0	0
Clare.....	8,290	2	2	2.41	2.41	Muskegon.....	35,307	28	26	7.93	7.36
Clinton.....	26,077	13	7	4.99	2.68	Newaygo.....	18,112	11	11	6.07	6.07
Crawford.....	2,521	3	2	11.90	7.93	Oakland.....	43,749	43	29	9.83	6.63
Delta.....	22,211	12	7	5.40	3.15	Oceana.....	17,275	15	10	8.68	5.79
Dickinson.....	15,261	17	5	11.14	3.28	Ogemaw.....	5,679	6	6	10.57	10.57
Eaton.....	33,011	27	24	8.18	7.27	Ontonagon.....	9,211	5	3	5.43	3.26
Emmet.....	12,231	11	8	8.99	6.54	Osceola.....	17,859	11	10	6.16	5.60
Genesee.....	41,395	41	26	9.90	6.28	Oscoda.....	1,733	2	2	11.54	11.54
Gladwin.....	5,419	3	1	5.54	1.85	Otsego.....	5,186	5	3	9.64	5.78
Gogebic.....	14,771	6	6	4.06	4.06	Ottawa.....	41,877	20	15	4.78	3.58
G'd Traverse.....	20,635	8	6	3.88	2.91	Presque Isle.....	6,829	2	2	2.93	2.93
Gratiot.....	28,857	14	11	4.85	3.81	Roscommon.....	1,375	3	2	21.82	14.55
Hillsdale.....	29,981	21	15	7.00	5.00	Saginaw.....	81,528	35	32	4.29	3.93
Houghton.....	50,630	41	30	8.10	5.93	Sanilac.....	34,962	29	26	8.29	7.44
Huron.....	35,059	14	11	4.00	3.14	Schoolcraft.....	8,109	7	7	8.63	8.63
Ingham.....	41,206	30	18	7.28	4.37	Shiawassee.....	34,281	19	17	5.54	4.96
Ionia.....	36,334	26	20	7.16	5.50	St. Clair.....	55,983	29	22	5.18	3.93
Ioseo.....	10,177	12	11	11.78	10.81	St. Joseph.....	24,885	25	18	10.05	7.24
Iron.....	5,494	2	1	3.64	1.82	Tuscola.....	35,840	20	17	5.58	4.74
Isabella.....	23,430	15	12	6.40	5.12	Van Buren.....	31,447	30	30	9.54	9.54
Jackson.....	47,663	41	37	8.60	7.76	Washtenaw.....	44,483	24	21	5.40	4.72
Kalamazoo.....	44,143	47	41	10.65	9.29	Wayne.....	318,971	118	115	3.70	3.61
Kalkaska.....	6,000	3	2	5.00	3.33	Wexford.....	16,124	15	14	9.30	8.68
Kent.....	130,950	144	138	11.00	10.54						

*Population estimated by average annual increase (arithmetical method), based on U. S. Census of 1890 and the State Census of 1894. Computed in the office of the State Board of Health.

DISTRIBUTION OF CONSUMPTION IN MICHIGAN IN 1897
BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10.000
INHABITANTS.



S. = Localities, C. = Cases per 10,000 population; D. = Deaths per 10,000 population.

Table 5 apparently indicates that in 1897 the most deaths from consumption occurred in the late fall and early winter months; but the reason for this is believed to be the fact that the new law for reporting deaths to the Secretary of State took effect at that time, so that there is really no evidence of any real increase of deaths from consumption at that time.

TABLE 5.—*Exhibiting, by months, the number of deaths from Consumption that were reported to have occurred in Michigan in the four years, 1894-97. (Compiled from such reports to the State Board of Health, as stated the time of death.)*

Year.	Total number.	Number of deaths for each month.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1894.....	453	32	28	33	41	45	40	36	33	35	37	41	52
1895.....	513	42	41	45	39	43	34	33	44	40	38	55	59
1896.....	865	74	67	42	95	97	66	67	74	52	68	79	84
1897.....	881	44	30	33	25	33	28	22	33	40	176	201	216
Av. 4 years, 1894-7.	678	48	42	38	50	55	42	40	46	42	80	94	103

Source of Contagium of Consumption.

Of the 1,715 cases of consumption reported during the year 1897, as exhibited in Table 6, the local health officer reported the source of contagium as follows: Traced to a former case, 82; reported as inherited, 40; attributed to "taking cold" or "exposure," 61; attributed to "la grippe," etc., 58; attributed to contagium from outside of jurisdiction, 17; unknown or indefinitely reported, 279; source not reported, 1,178; total, 1,715.

TABLE 6.—*Reported source of contagium of Consumption in 1897.*

Source.	Numbers of cases.
Cases reported as traced to a former case.....	82
Cases reported as inherited.....	40
Cases attributed to "taking cold" or "exposure".....	61
Cases attributed to "la grippe" and other diseases.....	58
Cases attributed to contagium from outside of jurisdiction.....	17
Cases, the sources of contagium of which were reported as unknown, or the statements were too indefinite for classification.....	279
Cases, the sources of contagium of which were not reported.....	1,178
All cases.....	1,715

How Consumption is most commonly Spread.

The tubercle bacillus, the specific cause of consumption, is found in an active state in the sputa from the lungs of persons suffering from that disease. The dust of dried tubercular sputum, when inhaled by susceptible persons, is thought to be the most common way of transmitting pulmonary consumption from person to person. The members of a family or household in which there is a consumptive person may be constantly exposed to the danger of infection, unless the sputa are carefully col-

lected and destroyed. The object of much of the work done by the State Board of Health is to cause the destruction of infected sputa, and to educate the people in this simple means of restricting the spread of consumption.

On following pages is given official correspondence with local health officers bearing on the subject of consumption.

Does the law require the Health Officer to Disinfect a house after Death from Consumption?

James P. Maise, of Bear Lake Village, wrote to the secretary of this Board, March 12, 1897, as follows:

"Does the law require the health officer to disinfect a house where death has occurred from consumption? I have done so and our village board claims it is not required by law, and refuses to pay for the materials that were used in the disinfection.

"Please answer and oblige."

In answer to the above-quoted letter, the secretary of this Board wrote to Mr. Maise, March 13, in part as follows:

"After a death from pulmonary consumption, or the removal of a well-developed case of this disease, disinfection of rooms and contents liable to be infected should be done by the health officer, as required by law (act 137, laws of 1883), in all diseases 'dangerous to the public health.'"

Entering upon the Work of Restricting Consumption.

November 13, 1897, O. L. Dales, M. D., health officer of Grand Rapids, wrote to the secretary of this Board, as follows:

"Enclosed you will find some clippings, which we are going to try and place with the friends of consumptives, by addressing the attending physician.

"You will notice the instructions are gleaned from your 'Instructions to Consumptives and their Friends.' Hoping this meets your approval as being a step in the right direction. * * *"

The secretary replied to Dr. Dales, as follows:

"Accept my thanks for your letter of November 13, with two enclosures. I am exceedingly glad that your board will enter upon this very important work for the restriction of that most important disease—consumption. I have no doubt, whatever, that it will result in very great good. Permit me to suggest that in the next edition which you print you have something on the leaflet of 'Instructions,' etc., which shall show who is authority for the statements made. It might be in some such form as follows: 'Issued by the City Board of Health of Grand Rapids, Michigan.' If your board wishes, this office will supply you with our leaflet or with the slips such as those I enclose herewith, if your board will issue them as you are now proposing to do with those you sent me."

Who is liable for Bills Contracted in Caring for Indigent Consumptives?

J. V. Frazier, M. D., of Lapeer, wrote to this office, November 29, 1897, asking relative to indigent consumptives, as follows:

"I would like a few instructions relative to the care of consumptive cases where indigent. Who is directly responsible for bills contracted by health officer in caring for these poor people? Is the city council compelled by law to allow and pay such bills as are incurred for necessities in caring for this class? It might be well to state that at the last meeting of the board of supervisors of this county the new law was adopted making it law for each township or corporation to care for its own contagious disease cases. I have reported two cases of consumption to the city council. Both cases asking for unnecessary assistance, the aldermen have refused to do anything for them, claiming that it is the county poor commissioner who should look after their cases. I do not feel like incurring any bills which I may have to pay myself, so would like to know exactly what powers I possess in regard to consumptives exclusive of any orders from city council or health committee of the city council."

The reply to this letter, given by the Secretary of the State Board of Health, December 6, was as follows:

"The legislature of 1897 passed a law making each township or city in Lapeer county liable for any expenses incurred in the care of dangerous communicable diseases, therefore the city of Lapeer is required by said law to provide for the care of such cases where the person is not able to pay. It would probably be better for you to have some understanding with the city before you incur any bills, and the city should certainly provide for the care of the dangerous communicable diseases which may occur in the city. Consumption is the most dangerous communicable disease.

"P. S. Your powers and duties are specified in act 137, laws of 1883, which you had best read very carefully."

Consumption is a Dangerous Communicable Disease.

February 17, 1898. N. Bates, M. D., of Flint, wrote to the secretary of this Board, as follows:

"Your postal received asking me why I do not comply with the law and make a final report of a case of consumption of January 10, 1898. Consumption is not reported. I send you on weekly reports the number of cases that come to my knowledge, and furnish them with the literature sent me or the attending physician. I do not quarantine or placard a house as instructed by the Board of Health. Some of the cases, if known to me, I could satisfactorily make final reports upon.

"I use formaldehyde for disinfecting.

"Most of the cases of consumption do not come to my knowledge till I look over the burial permits."

In reply, the secretary wrote, February 19:

"Your letter of February 17, relative to consumption, is before me, for which please accept thanks. The State Board of Health has declared consumption to be a disease dangerous to the public health and as such it is required by law to be reported directly to the health officer, and the law provides a penalty in case the law is not complied with. If this law is being violated, it is your duty, under the law, a copy of which I herewith enclose, to report all such violations to the prosecuting attorney. It is believed by proper effort,—calling attention to the law, etc., the local board of health can so educate the citizens under its care as to the necessity of promptly reporting all cases of diseases which endanger the public health, that prosecutions for neglect to so report such diseases will be unnecessary. It is also believed that such education can largely be accomplished by the distribution of the leaflets issued by this Board relative to the restriction and prevention of dangerous communicable diseases, and I am very glad to know that you are so distributing the leaflets.

"You say, 'I do not quarantine or placard a house as instructed by the Board of Health.' I do not quite understand why you think the State Board of Health advises the placarding and isolation of consumption, for nowhere in the leaflets of instructions issued by this Board is the subject of placarding and isolation advised, except it is stated that if the patient is willful, ignorant or insane, and will not observe the precautions advised by this Board, then it should be a subject for the health officer and the local board of health to consider as to whether the patient should be isolated or not, but under no circumstances is placarding or isolation advised. Herewith I enclose marked leaflets relative to the subjects above mentioned. I trust that you will investigate the deaths from consumption, relative to which I have written you before, and make special final reports upon the blanks which have been sent to you for that purpose."

Ages of Greatest Prevalence of, and Mortality from, Consumption.

In Table 7 are shown the numbers of cases and deaths from consumption in Michigan in 1897, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in principal groups were of all deaths.

From Tables 8 and 9, it may be seen that there were 266 more deaths reported from consumption among females than among males (where age and sex were stated in the reports), during the years 1894-97.

Table 9 shows that the highest per cent of reported deaths, for each sex, occurred in the age period from 20 to 29 years. The average age at death was three years more for males than for females in 1897.

TABLE 7.—*Exhibiting in certain age-groups, the number of cases and the number of deaths from Consumption; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in each group were of the cases in that group. (Compiled from all reports for the year 1897 which stated the ages.)*

Ages in groups of years.	Number and per cent of cases and deaths in certain age-groups.															
	All known ages.	Under 10 years.	10 to 14.	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.	55 to 59.	60 to 64.	65 to 69.	70 to 74.	75 years and over.
No. of cases.....	*934	22	23	101	141	124	118	115	75	54	40	35	27	32	13	14
Per cent the cases in each group were of all cases of known ages..	100	2.4	2.5	10.8	15.1	13.3	12.6	12.3	8.0	5.8	4.3	3.7	2.9	3.4	1.4	1.5
No. of deaths.....	868	22	23	95	131	116	109	103	65	49	37	33	27	31	13	14
Per cent the deaths in each group were of cases in that group...	92.9	100	100	94.1	92.9	93.5	92.4	89.6	86.7	90.7	92.5	94.3	100	96.9	100	100
Per cent the deaths in each group were of all deaths at known ages.	100	2.5	2.6	10.9	15.1	13.4	12.6	11.9	7.5	5.6	4.3	3.8	3.1	3.6	1.5	1.6
Per cent the deaths in special groups were of all deaths at known ages.....		5.1		39.4			32.0						23.5			

*Does not include those cases or deaths where the age was not stated.

TABLE 8.—*Exhibiting, by sex, the ages of 1,712 persons who died of Consumption, during the years 1894-7. (Compiled from such reports to the State Board of Health, as stated sex and age.)*

Year.	1894.			1895.			1896.			1897.		
Age at death.	Males.	Females.	Totals.	Males.	Females.	Totals.	Males.	Females.	Totals.	Males.	Females.	Totals.
10 years and under	5	2	7	1	7	8	3	1	4	10	12	22
10 to 20 years	14	39	53	13	26	39	10	32	42	44	74	118
20 to 30 "	33	44	77	29	56	85	36	68	104	116	131	247
30 to 40 "	20	31	51	27	44	71	32	47	79	94	118	212
40 to 50 "	13	12	25	13	24	37	10	24	34	58	56	114
50 to 60 "	8	6	14	9	10	19	10	10	20	35	35	70
60 to 70 "	6	14	20	7	9	16	5	10	15	32	26	58
70 to 80 "	3	3	6	3	7	10	4	1	5	17	10	27
Over 80 "	2	0	2	1	0	1	0	0	0	0	0	0
	104	151	255	103	183	286	110	193	303	406	462	868

TABLE 9.—*Exhibiting, by sex and in certain age-groups, the per cent of persons who died from Consumption in Michigan, during the years 1894-7; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

Deaths from Consumption.													
Year.	Sex.	Average age, years.	No. of deaths included.	Ages.—In periods of years. Per cent of deaths in each period of age.									
				All ages.	Under ten years.	10 to 19.	20 to 29.	30 to 39.	40 to 49.	50 to 59.	60 to 69.	70 to 79.	Over 80 years.
1894.	Males.....	34.7	104	100	5	13	32	19	13	8	6	3	2
	Females.....	32.7	151	100	1	26	29	21	8	4	9	2	0
1895.	Males.....	36.2	103	100	1	9	30	27	13	10	7	3	1
	Females.....	33.4	183	100	4	10	34	24	13	6	4	5	0
1896.	Males.....	33.9	110	100	3	9	33	29	9	9	5	4	0
	Females.....	31.2	193	100	1	17	35	24	12	5	5	1	0
1897.	Males.....	35.9	406	100	3	11	29	23	14	9	8	4	0
	Females.....	32.9	462	100	3	16	28	26	12	8	6	2	0

DURATION OF CONSUMPTION.—FATAL AND NON-FATAL CASES.

TABLE 10.—*Exhibiting, by sex of patient, the duration in months and years of fatal cases of sickness from Consumption, in Michigan, during the years 1894-97, arranged in time-periods. (Compiled from those reports which stated the length of time the patient was sick.)*

Fatal cases of Consumption.																				
Year.	Sex.	No. of cases in- cluded.	Duration of sickness:—Per cent of deaths in each period.																	
			All cases.	1 Month.	2 Months.	3 Months.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.	9 Months.	10 Months.	11 Months.	Under one year.	1 to 2 yrs.	2 to 3 yrs.	3 to 4 yrs.	4 to 5 yrs.	Five years and over.
1894.	Males.....	44	100	9.1	9.1	2.3	4.5	9.1	4.5	2.3	11.4	9.1	6.8	0	68.2	20.5	6.8	0	2.3	2.3
	Females....	88	100	4.5	5.7	11.4	4.5	8.0	6.8	6.8	2.3	9.1	1.1	6.8	67.0	19.3	3.4	8.0	1.1	1.1
1895.	Males.....	43	100	9.3	2.3	2.3	9.3	9.3	10.6	4.7	7.0	2.3	2.3	0	60.5	16.3	9.3	9.3	0	4.7
	Females....	99	100	2.0	7.1	8.1	7.1	4.0	9.1	6.1	6.1	4.0	4.0	3.0	60.6	28.3	5.1	2.0	2.0	2.0
1896.	Males.....	82	100	2.4	8.5	6.1	2.4	18.3	9.8	1.2	3.7	3.7	0	1.2	61.0	26.8	3.7	2.4	0	6.1
	Females....	135	100	3.0	4.4	13.3	5.2	5.2	9.6	6.7	5.2	3.0	3.0	3.7	62.2	17.0	10.4	1.5	3.7	5.2
1897.	Males.....	246	100	6.5	4.1	2.8	6.5	3.3	6.9	3.3	1.6	2.4	4.9	2.0	44.3	30.9	13.0	4.5	2.0	5.3
	Females....	321	100	3.1	2.5	3.7	4.7	3.7	5.9	6.5	3.7	5.0	4.6	3.7	47.3	23.1	14.0	4.4	1.2	10.0

*One case was reported as having been sick about 30 years.

By Table 10, it may be seen that from reports received during the years 1894-7, which stated the interval between the time of being taken sick and the time of death from consumption, the largest per cent (from 44 to 68, varying with the year and sex), occurred in the first year of sickness. The next highest per cent of deaths occurred in the second (1 to 2) year of sickness, and as the duration of sickness grew longer the per cent of deaths decreased. The average duration of fatal cases reported in the four years, 1894-7, was for males 17.3 months, and for females 19.0 months.

TABLE 11.—*Exhibiting, by sex of patient, the duration in months and years, of non-fatal cases (still sick) of Consumption, in Michigan, in the years 1894-7, as stated in the reports to the State Board of Health.*

Non-fatal cases of Consumption.																						
Year reported	Sex.	No. of cases included.	Duration of sickness:—Per cent of cases in each period.																			
			All periods.	1 Month.	2 Months.	3 Months.	4 Months.	5 Months.	6 Months.	7 Months.	8 Months.	9 Months.	10 Months.	11 Months.	Under 1 yr.	1 to 2 yrs.	2 to 3 yrs.	3 to 4 yrs.	4 to 5 yrs.	5 to 9 yrs.	10 years and over.	
1894.	Males...	22	100	4.55	4.55	4.55		0	9.09	4.55	4.55	4.55	4.55	0	4.55	45.45	31.82	9.09	9.09	0	0	*4.55
	Females	14	100	7.14	21.43	0		0	7.14	0	0	21.43	0	0	7.14	64.29	28.57	0	0	†7.14	0	0
1895.	Males...	20	100	10.0		0	0	20.0	5.0	0	0	10.0	5.0	10.0	5.0	65.0	15.0	15.0	5.0	0	0	0
	Females	30	100	6.7	10.0	6.7	6.7	0	6.7	3.3	13.3	6.7	10.0	6.7	76.7	16.7	6.7	0	0	0	0	0
1896.	Males...	19	100	5.3	5.3	0	0	0	0	0	0	0	10.5	10.5	31.6	31.6	10.5	21.1	0	5.3	0	
	Females	28	100	3.6	3.6	7.1	3.6	0	7.1	3.6	3.6	17.9	3.6	3.6	57.1	28.6	0	14.3	0	0	0	0
1897.	Males...	18	100	5.6		0	16.7	5.6	0	0	11.1	16.7	5.6	5.6	5.6	72.2	11.1	11.1	0	5.6	0	0
	Females	17	100	17.6		0	5.9	5.9	5.9	5.9	0	5.9	17.6	0	0	64.7	17.6	5.9	0	0	†17.6	0

*One case was reported as having been sick from 10 to 12 years.

†One case was reported as having been sick from 4 to 5 years.

‡One case was reported as having been sick 7 years.

In Table 11 it may be seen that in non-fatal cases of consumption from 31 to 100 per cent (varying with the year and sex) were reported as having been sick less than one year, from 11 to 31 per cent had been sick from one to two years, and the per cent of cases decreased as the period of duration grew longer. The average duration of sickness for the four years, 1894-7, was: In males 16.4 months, in females 8.6 months.

Cases of Consumption Reported as having Recovered.

In the reports relative to consumption received at this office during the years 1894-7, thirty-three cases were said to have recovered from the disease; eleven of these cases were reported in 1894, six in 1895, seven in 1896, and 9 in 1897; they are tabulated below according to sex, age and duration:—

Sex.	Age.	Duration.	Sex.	Age.	Duration.
Males.....	14 years.	Not stated.	Females..	21 years.	2 years and 8 mo.
	18 years.	7 months.		19 years.	5 months.
	27 years.	4 months.		35 years.	3 months.
	Not stated.	3 years and 10 mo.		Not stated.	1 year.
	41 years.	Not stated.		37 years.	2 months.
	19 years.	7 months.		20 years.	Not stated.
	27 years.	8 months.		22 years.	Not stated.
	29 years.	1 year.		16 years.	Not stated.
	26 years.	4 months.		36 years.	9 months.
	34 years.	Not stated.		Not stated.	Not stated.
	26 years.	Not stated.			
	35 years.	2 years.			
	47 years.	3 months.			
	35 years.	1 month.			
	42 years.	1 year.			
	Not stated.	Not stated.			
	Not stated.	Not stated.			
Sex, age and duration not stated in six of the cases reported as having recovered.					

The average age of the fourteen male cases, where the ages were stated, was 30 years; of the eight female cases, 25.8 years.

The average duration of sickness, where the time was stated was for males, 11.6 months; for females, 10.5 months.

Information contained in final reports of cases of Consumption during the years 1895-7.

For the year 1895, 42 final reports of fatal cases of consumption in Michigan, were received at this office; for 1896 there were 137, and for 1897, 457 such final reports received relative to fatal cases of consumption. The information contained in these 636 reports, for the three years, is combined and summarized below:

Location of the disease, reported in 519 instances.

Lungs.....	458	Liver.....	2
Bowels.....	20	Kidneys.....	1
Throat.....	7	Inguinal.....	1
Bronchi.....	6	Mesenteric glands.....	1
Lungs and throat.....	5	Ovaries.....	1
Lungs and bowels.....	5	Spleen.....	1
Stomach.....	4	Alimentary canal.....	1
Chest.....	2	Liver and bowels.....	1
Thorax.....	2	Stomach and bowels.....	1

Consumptive relatives, reported in 242 instances.

Sister.....	41	Father and brother.....	5
Mother.....	36	Son.....	4
Brother.....	21	Wife and daughter.....	3
Father.....	16	Mother and brother.....	2
Aunt.....	12	Mother, sister and brother.....	2
Daughter.....	11	Mother and aunt.....	2
Cousin.....	9	Grandmother, aunt and cousin.....	2
Grandparents.....	9	Parents and aunt.....	1
Father and mother.....	9	Great-grandmother, uncle and aunt.....	1
Brother and sister.....	8	Mother and son.....	1
Mother and sister.....	8	Mother and wife.....	1
Wife.....	7	Granddaughter.....	1
Father and sister.....	7	Sister and niece.....	1
Husband.....	6	Father and cousin.....	1
Husband and daughter.....	1	Mother and cousin.....	1
Brother and husband.....	1	Brother and cousin.....	1
Sister and husband.....	2	Niece.....	3
Uncle.....	5	Nephew.....	1

Consumptive associates were reported in 131 instances as follows.

Sister.....	27	Wife and sister.....	2
Mother.....	16	Aunt and mother.....	2
Brother.....	10	Parents and aunt.....	1
Father.....	7	Uncle.....	1
Daughters.....	7	Father and brother.....	1
Wife.....	6	Mother and wife.....	1
Husband.....	5	Stepmother.....	1
Mother and father.....	5	Mother, brother and sister.....	1
Mother and sister.....	4	Brother and husband.....	1
Aunt.....	4	Brother and two nieces.....	1
Brother and sister.....	4	Mother-in-law.....	1
Friend.....	3	Sister and husband.....	1
Cousins.....	3	Mother and cousin.....	1
Father and sister.....	3	Grandmother.....	1
Family.....	2	Brother and cousin.....	1
Neighbor.....	2	Husband and daughter-in-law.....	1
Son.....	2	Father and grandmother.....	1
Wife and daughter.....	2		

Occupation of consumptives, reported in 557 instances.

Housewife.....	221	Woodman.....	1
Farming.....	106	Ship-tender.....	1
Student.....	43	Commercial traveler.....	1
Laborer.....	41	Butcher.....	1
Domestic servant.....	27	Doctor.....	1
Saloon-keeper.....	10	Gambler.....	1
School teacher.....	10	Buttermaker.....	1
Milliner and dressmaker.....	9	Artist.....	1
Merchant.....	8	Drayman.....	1
Clerk.....	7	Candymaker.....	1
Accountant and cashier.....	6	Mill hand.....	1
Machinist.....	5	Cutter.....	1
Carpenter.....	5	Designer.....	1
Cook.....	4	Dealer in wool and hides.....	1
Miner.....	4	Telegraph operator.....	1
Railroad men.....	3	Photographer.....	1
Printer.....	3	Baker.....	1
Lumber dealer.....	3	Barber.....	1
Mason.....	3	Minister.....	1
Painter.....	3	Molder.....	1
Shoemaker.....	3	Stenographer.....	1
Cigarmaker.....	3	Blacksmith.....	1
Nurse.....	2	Hotel-keeper.....	1
Engineer.....	2	Foreman.....	1
Watchman.....	2		

The method of disinfection of sputa and soiled articles was mentioned in 328 instances, as follows :

Burned.....	157	Lime and burning.....	2
Carbolic acid.....	18	Washing and sulphur fumes.....	2
Sulphur fumes.....	17	Burying and boiling.....	2
Boiled.....	17	Clothes burned.....	1
Boiled and burned.....	10	Antiseptic paper burned.....	1
Disinfected.....	8	Disinfected and washing.....	1
Buried.....	7	Washing and burning.....	1
Chloride of lime.....	7	Burning and sulphur fumes.....	1
Bichloride of mercury.....	6	Burning and zinc sulphate.....	1
Boiling and sulphur fumes.....	6	Zinc.....	1
Washing.....	4	Boiling and zinc.....	1
Heating and sulphur fumes.....	4	Buried and bichloride.....	1
Ashes.....	3	Chlorides and sulphur fumes.....	1
Carbolic acid and boiling water.....	2	Not disinfected.....	46

Bowel discharges were disposed of in 403 instances as follows :

Buried.....	89	Sulphate of iron.....	2
Vault.....	63	Scalded.....	1
Privy.....	59	Boiled.....	1
Burned.....	57	Scalded water.....	1
Lime.....	24	Zinc solution.....	1
Closet.....	23	Boiling water.....	1
Disinfected.....	19	Lime and sulphur.....	1
Ground.....	12	Lime and disinfection.....	1
Sewer.....	11	Disinfection and privy.....	1
Carbolic acid.....	8	Buried and disinfection.....	1
Carried away.....	5	Bichloride and buried.....	1
Chloride.....	5	Bichloride and privy.....	1
Ashes.....	4	Buried and lime.....	1
Buried and lime.....	3	Privy and lime.....	1
Copperas.....	3	Privy and disinfection.....	1
Privy and ashes.....	2		

In 1897, reports to this office contained information relative to beginning of sickness of consumptives as follows:

Disease was stated to have begun in 265 instances with—

Bad cold.....	117	Malarial-fever.....	3
Influenza.....	32	Wasting away.....	2
Bronchitis.....	30	After measles.....	2
Grippe.....	29	Pleurisy.....	2
Hemorrhage.....	21	Brain fever.....	1
Pneumonia.....	14	Child-birth.....	1
Catarrh.....	5	Dyspepsia.....	1
Typhoid fever.....	4	Lumbago.....	1

Nationalities of consumptives, reported in 405 instances.

American.....	226	Scotch.....	8
German.....	55	Polish.....	3
Irish.....	24	Belgian.....	2
Canadian.....	22	Finnish.....	2
English.....	17	Norwegian.....	2
French.....	15	Danish.....	1
Dutch.....	14	Nova Scotian.....	1
Swedish.....	12	Caucasian.....	1

Of the 936 consumptives of whom the sex was stated, 427 were males and 509 were females.

Of 663 consumptives of whom the color was stated 638 were white, 10 black (negroes) and 15 red (indians).

The complexion of 365 consumptives was stated as: black 6, dark 128, light 231.

Color of hair was stated in 353 instances as: black 34, dark 132, brown 45, auburn 40, light 96, white or gray 6.

Of the civil condition of 445 consumptives 281 were reported as married, 164 single.

Of 271 replies given in the reports to the question, were sputa of consumptives bacteriologically examined, 197 were "no" and 74 "yes."

To the question, were discharges from the bowels of consumptives bacteriologically examined, there were but five answers, all in the negative.

In answer to the question, were persons or animals infected from this patient, in eight instances the reply was "yes."

TUBERCULOSIS IN CATTLE IN MICHIGAN IN 1897.

During the year 1897, communications were received at the office of the State Board of Health, stating the presence of tuberculosis in animals in ten localities in Michigan, relative to which the following are extracts from the correspondence of this office:

Bovine Tuberculosis in Salem Township, Allegan County.

February 9, 1897, H. W. Heasley, M. D., of Salem Township, wrote to this office as follows:

"We have a suspected case of bovine tuberculosis in our town, two cows. How shall we proceed? 1. Can I secure the tuberculin with directions to make the test? 2. Must a veterinary surgeon be secured to examine the animals if it is so I can make the test myself? 3. The people are poor. Who must pay expense? If public, please state town, county, or State. Must they lose their cows or can the board of health vote to pay them?"

In reply to Dr. Heasley's letter, February 11, the secretary wrote as follows:

"Your letter of February 9, relative to bovine tuberculosis, is before me, for which please accept thanks.

"I have copied your letter and sent it to Hon. H. H. Hinds, President of the State Live Stock Commission, at Stanton, Michigan. The State Live Stock Commission has such subjects in hand, and will probably investigate; at least they have signified that they intended to investigate in every case or outbreak of bovine tuberculosis which was reported. I have requested Mr. Hinds to answer questions."

Tuberculosis in Cattle in Dover Township, Lenawee County.

May 19, 1897, W. H. Nichols, of Dover Township, wrote to Dr. Edgar, member of the Legislature, relative to tuberculosis in his jurisdiction, as follows:

"My neighbor, Mr. Woodbur Jones, requested me to write you about a cow he bought six weeks ago that is sick. She has the appearance of having the tuberculosis and he wishes to have you, if you will, report it to the proper authorities and have them come and see to it as soon as possible. The cow formerly came from the John G. Mason herd; they had considerable trouble with them."

Dr. Edgar referred Mr. Nichols' letter to the secretary of this Board. In reply to W. H. Nichols' letter, May 20, 1897, the secretary wrote:

"Your letter of May 19, relative to a tuberculous cow, has been referred to me by Hon. W. R. Edgar. I have complied with your request, and placed the facts before H. H. Hinds, President of State Live Stock Commission, Stanton, Michigan, asking him to give the subject his attention. I think the State Live Stock Commission has had some experience with the herd of John G. Mason. Whether or not they will send the State Veterinarian I cannot tell, but I believe that it is usual for such cases to be investigated."

Tuberculosis in Cattle in York Township, Washtenaw County.

August 23, 1897, Webster Cook, 91 Horton Ave., Detroit, wrote to this office as follows:

"In a recent visit to my father's farm, I found among the cattle on the place, a sick cow which I induced my brother to kill. He examined her lungs and found they were nearly gone with tuberculosis. Father bought the cow at an auction, I think in March. She has been with his herd of 15 or 20 cattle since. She was sick when he got her, and there were other cattle in the herd, from which she was bought and which were sold at the same time. So it seems to me that there is considerable probability, not only in father's herd, but to a good many others also, of a great deal of spreading of this awful

disease. I should think the case ought to be investigated, and call your attention to it, with the hope that you will have the authority and disposition to give it proper attention, for all of father's cattle, and all other herds into which the auction cattle were introduced, ought to be subjected to the tuberculin test.

"Father's name is Peter Cook; his farm is at the station of Urania, between Ann Arbor and Milan, on the Ann Arbor railroad. For further particulars you can write to me, or send some one to Urania."

In reply to Mr. Cook's letter, August 25, 1897, the secretary wrote:

"Your letter of August 23, relative to tuberculosis, is before me. The subject of the health of the live stock is in the hands of the 'State Live Stock Commission.' I have this morning made a copy of your letter, and transmitted the copy to the Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Michigan. He will probably give the subject his attention.

"There ought to be some provision for such investigations, but whether or not there is, I think Mr. Hinds can tell you. This Board is not in a position to make such investigations, neither has it the funds and power.

"I am interested in the subject, and I hope you will keep this office informed concerning the outbreak, if anything further develops. By this mail I send you a number of publications of this office, in which you may be interested.

"I would be glad to be informed whether or not any milk from that sick cow was used. If it was, I would like to have details of its use, whether mixed with other milk, whether sold, whether used in family, and if so whether drank raw by children, any results observed."

August 28, 1897, Mr. Cook replied to the secretary's letter, as follows:

"Your favor of the 25th inst. is at hand. I think no milk of the cow I wrote you about was ever used in any way about father's farm, in the family or for calves or pigs. I have not heard from Mr. Hinds, but trust he will be able to give the matter some attention. If any more facts connected with the matter come to my notice I will give you the desired information.

"I am very glad to get the pamphlets you sent me, for which please accept my thanks."

Tuberculosis in Cattle in Wyoming Township, Kent County.

December 9, 1897, a telegram was received at this office from Secretary Baker, as follows:

"George Wykes, township of Wyoming, has alleged tuberculous cow. Notify Wyoming Health Officer."

The following letter was sent to Dr. John Cooper, Health Officer of Wyoming Township, December 9:

"Information reaches this office that George Wykes, of Wyoming township, has an alleged tuberculous cow.

"This is a subject which should receive your immediate attention. Section 9316, Howell's Statutes, reads: 'If any person shall knowingly sell any kind of diseased, corrupted, or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer, he shall be punished by imprisonment in the county jail not more than six months, or by a fine not exceeding two hundred dollars.'

"I think that the meat or milk from a tuberculous cow would be likely to be dangerous to the public health, and any person selling the same could be punished under the above-mentioned law.

"Will you kindly investigate this subject and report to this office?"

"The law requires that it should be reported to the State Live Stock Sanitary Commission, and I have written to the president, Hon. H. H. Hinds, Stanton, Michigan."

Tuberculosis in Cattle in Emmet Township, St. Clair County.

April 1897, J. A. Thompson, M. D., wrote to this office as follows:

"Tuberculosis has broken out in David Foley's herd of cattle. I was instructed by the township supervisor to isolate infected premises and notify you.

"The location of infected farm is W. $\frac{1}{2}$ of S. E. $\frac{1}{4}$ of Section 9, in the township of Emmet, St. Clair County, Michigan."

In reply to Dr. Thompson's letter, April 14, 1897, the secretary wrote as follows:

"Please accept thanks for your letter of no date, relative to tuberculosis in the herd of Daniel Foley. I have notified the president of the State Live Stock Commission, Hon.

H. H. Hinds, of Stanton, and I presume the subject will receive immediate attention. You had probably better notify Mr. Hinds."

Tuberculosis in Cattle in Byron Township, Kent County.

October 2, 1897. O. L. Dales, M. D., Health Officer of Grand Rapids, wrote to this office as follows:

"I am informed that Wm. Ledger, of Byron Centre, has purchased a cow that is reported as having tuberculosis, by Dr. Strang of Byron Centre. Bacteriological examinations were made from the lungs of a cow which died, belonging to the man from whom Ledger purchased this cow, and it was found to be affected with tuberculosis.

"Wm. Ledger lives one-half ($\frac{1}{2}$) mile south of Byron Centre and it is reported he intends to slaughter this animal, and sell for use."

October 4, 1897, the secretary wrote Samuel Tobey, Health Officer of Byron Township, as follows:

"It is reported to this office that William Ledger, of Byron Centre, has purchased a cow that is believed to be suffering with tuberculosis, and that said William Ledger intends slaughtering the animal for use, and sale.

"This is a subject which should receive your immediate attention. Section 9316, Howell's Statutes, reads: 'If any person knowingly sell any kind of diseased, corrupted, or unwholesome provisions, whether for meat or drink, without making the same fully known to the buyer, he shall be punished by imprisonment in the county jail not more than six months, or by fine not exceeding two hundred dollars.'

"I think that the meat or milk from a tuberculous cow would be likely to be dangerous to the public health, and any person selling the same could be punished under the above-mentioned law.

"Will you kindly investigate and report to this office."

Tuberculosis in Cattle in Napoleon Township, Jackson County.

May 4, 1897, C. W. Kirtland, M. D., Health Officer of Napoleon Township, wrote to this office as follows:

"John Noon, of this town, sold a cow which on being killed was found to be filled with tubercles, and the lungs full of cavities. What is to be done with his other cattle?"

May 5, 1897, the secretary replied to Dr. Kirtland's postal, as follows:

"Please accept thanks for your postal card of May 4, giving me information relative to the tuberculous cow. This is a subject which should be reported to the Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Michigan. That Commission has charge of the health of the live stock. However, I have sent this morning to Mr. Hinds a copy of your postal card. He will probably correspond with you.

"I shall be glad to know what has been done with the meat from the cow that was found to be tuberculous. The meat and milk of tuberculous cows are known to be dangerous to the health of those persons using the same, and should be most thoroughly cooked before being used for human or animal food. There ought to be some definite law on this subject of the danger of spreading tuberculosis by the milk and meat. However, the local board of health could, under sections 1636 and 1639, Howell's Statutes, frame and publish a milk ordinance which would regulate the sale of milk. I send you a copy of such an ordinance. The other cattle ought to be tested with tuberculin. Perhaps the State Live Stock Commission will test the herd.

"If this office can be of further service to you, it will give me pleasure."

Tuberculosis in Cattle in Manistique, Schoolcraft County.

June 28, 1897, J. M. Sattler, M. D., Health Officer of Manistique, wrote to this office, as follows:

"Dr. Sellers, V. S., of Manistique, reported a cow to me the other day which has symptoms of 'tuberculosis.' I went with him to see her Saturday evening. She calved six weeks ago, at least apparently so. She soon developed a cough, got very thin, etc. Dr. Sellers did not see her until one week ago. Her respirations are 42, pulse 60, temperature slightly elevated, is thin and anemic, appetite fairly good. We ordered her to be stabbed at once. Dr. Sellers wants to try the tuberculin test. I take this opportunity to write you for advice. Let me know at once what steps to take. If you think best to send State V. S. do so, or if you think the tuberculin test proper, send some of it. We have not any."

June 30, 1897, the secretary replied to Dr. Sattler, as follows:

"Your letter of June 28, relative to tuberculosis in a cow is before me, for which please accept thanks. You should at once notify the State Live Stock Sanitary Commission, of which the Hon. H. H. Hinds, of Stanton, is president. I will notify him at once.

"Relative to the tuberculin test, I think it should be made, but this office does not keep the tuberculin. I presume the President of the State Live Stock Commission will inform you where you can obtain it."

Tuberculosis in Cattle in Menominee, Menominee County.

March 3, 1897, this office received a letter from John F. Hicks, M. D., Health Officer of Menominee City, as follows:

"I suppose you have heard that our State Board of Live Stock Commission were here? In Mr. S. M. Stephenson's herd of cattle, out of 47 head they found 40 to have tuberculosis, and had them slaughtered.* As there has been a good deal of business between this herd and other herds about here, we are somewhat fearful that the disease may be found in other herds and in that way our milk supply may be taken to some extent from cows having tuberculosis. I am now formulating an amendment to our milk ordinance covering that ground. Any suggestion from you on the matter will be thankfully received. We have this matter entirely under our control. In this way I can make any milk license when I think it for the public safety to do so. Do you not think it wise to compel an examination of all cows furnishing milk for sale, and to insist on the tuberculin test being used? And in cases where no reaction took place to repeat the test again, say in one year, or to have all dairy cows examined once a year and tested with tuberculin. In the meantime compel every dairyman to produce a clean bill of the health of his cows from a veterinarian approved of by the health officer. Have you any late literature or reports on the subject of tuberculosis in cattle and the use of tuberculin as a disease nostrum? I am gathering all the late information on the subject I can. One point I am not altogether clear on. I understand if tuberculin is administered to a cow and reaction is shown, a second administration will not give a reaction. Now the question I wish to have settled is, if no reaction take place we presume the cow is free from tuberculosis at that time. Then supposing in one year from that time we are desirous of knowing if this same cow is still free from the disease, and we again inject a dose of tuberculin, in such a case will previous use of the tuberculin affect the action of this second dose in any way? While I have a good deal of literature on this subject most of it is two or three years old. I have sent for more and expect it in a few days. Where can we get tuberculin aside from the Department at Washington?"

March 5, 1897, Secretary Baker replied to Dr. Hicks' letter, as follows:

"Your very interesting letter of March 3, relative to tuberculosis in cattle, is before me, for which please accept my cordial thanks.

"I would think your suggestion relative to examination of dairy cows an excellent public-health measure for the protection of your citizens. I hope it will be done. Menominee has been very aggressive and energetic in public-health work, and I hope it will continue to be so.

"I would suggest that you correspond with Dr. D. E. Salmon, Chief of the Bureau of Animal Industry, Washington, D. C., who would be able to give you information concerning the supply, use, etc., of tuberculin. I have had no personal experience with tuberculin.

"I am very glad indeed to have your letter, and I hope you will inform me what you do in regulating the milk business. I shall be glad to have a copy of the ordinance as soon as it is printed.

"Dr. Salmon can best reply to the question you put to me relative to influence of one test by tuberculin on subsequent test when the first test was *not* followed by reaction."

March 6, 1897, this office received another letter from Dr. Hicks, which reads as follows:

"Since writing you a few days ago I have read in the Veterinarian Journal of Science for November, 1895, and February, 1896, Prof. Denar's inaugural address delivered at the opening of the Royal Veterinary College of Edinburgh and the struggle with tuberculosis in Denmark by Prof. E. Bang. I look upon these as very good articles on the subject of tuberculosis in cattle. In view of the condition of things here I believe I will ask to have an ordinance passed by our city council, making it compulsory to have all cows giving milk to sell, tested with tuberculin at least once a year, and as I believe new cases are more likely to show up in the spring after the cows have been housed all winter, I will have the general tests of all milk cows made in April of each year, in the meantime any cows added to the herd to be tested before the milk is offered for sale. According to both these writers, while they say injections of tuberculin will sometimes not give the reaction a second time in tuberculous cows, it has no immunizing influence on healthy cows and I learn they are testing some herds in Europe every 3 or 6 months."

*It is alleged that one of the grandchildren of Mr. Stephenson, who owned the herd of cows mentioned, had a tuberculous tumor removed from a finger about the time the animals were killed, and that another grandchild has enlarged cervical glands, perhaps tuberculous.—H. B. B., Sec.

PUERPERAL FEVER IN MICHIGAN IN 1897.

During the year ending December 31, 1897, two fatal cases of puerperal fever were reported to the office of the State Board of Health. These cases occurred, January, 1897, in the township of Allouez, Keweenaw County. The health officer, Dr. James Hoskings, wrote to this office for pamphlets, in the Finish language, in regard to this disease.

Secretary Baker replied January 25, 1897:

"I regret that I can send no printed instructions relative to this disease in any language; the State Board of Health has never prepared such a leaflet. Care should be taken, however, and disinfection should be practiced. The midwife should be kept under surveillance for some time and should not be permitted to attend in her practice until after a thorough disinfection of the hands at least."

When it is stated, as above, that two fatal cases of puerperal fever were reported to this office during the year 1897, it should not be understood that these were the only cases of this disease which occurred in the State in that year. Of the 4,418 postal-card reports received at this office during the year 1897 from observers in different parts of the State, 108, or about 2 per cent, stated the presence of sickness from puerperal fever in the localities from which the reports were sent.

MUMPS (PAROTITIS) IN MICHIGAN IN 1897.

During the year 1897, there were three outbreaks of mumps reported to this office, one from Kalkaska Village, Kalkaska County; one from Vienna Township, Genesee County; and the other from Vandalia Village, Cass County. In the first-mentioned outbreak one case of the disease was reported to have occurred. The patient was a female. In the second outbreak one case of the disease was reported to have occurred. The patient was a male 17 years of age. Relative to the last-mentioned outbreak, Dr. P. D. Greene, Health Officer of Vandalia Village, wrote to this office, January 25, 1897, as follows:

"The real cause for this letter is, however, mumps (epidemic parotitis). We are truly afflicted, and while I have no cases myself, from what I can learn the disease is spreading.

"The complications arising from mumps are, in my opinion, as serious as those from measles, and while it is practically out of the question to isolate each case, I have called upon several families and asked their assistance in the matter.

"Dr. Osborn, the Health Officer of Penn Township, and a man of 48 years experience in practice, is also of my opinion. What provisions, if any, has the State Board made and what are your instructions? There are at present about ten cases hereabouts, but a number have been exposed. I do not wish to assume any authority, or cause any ill feeling among my fellow practitioners, but I would like to spread a knowledge of this disease among the laity, as it may scare them into keeping away from it as much as possible, thereby assisting in stamping it out.

"I believe a circular printed, and distributed, setting forth the complications, etc., of this disease, would educate the people, and make them feel it was a serious thing, and not the, or rather one of the, necessary diseases incident to long life. I am sure I can get our board to pay for the printing of such a circular, if you so instruct, and I assure you whatever else you may suggest will be duly attended to."

January 27, 1897, the secretary wrote in reply to Dr. Greene's letter as follows:

"Relative to mumps, it is not generally considered a disease dangerous to the public health. However, it is a communicable disease and all who can do so would do well to keep away from persons who have it, and from the premises where the disease exists. This Board has never issued any circular or publication bearing upon mumps, for the reason that there are a number of other diseases much more dangerous to the public health, for instance consumption, and this Board finds it very difficult to get the co-operation of the people for the restriction and prevention of consumption, which causes many times more deaths than mumps, in the State. However, this office has no objection to your board doing what they may deem best for the restriction and prevention of mumps, and as I stated above, all should keep away from the disease who can do so."

LA GRIPPE,—INFLUENZA.

The following correspondence between the secretary of this Board and D. W. Mudge, M. D., Health Officer of Chesaning, Saginaw County, Michigan, contains suggestions relative to this disease which it is believed will be profitable to publish in this annual report, for further study.

February 12, 1897, the secretary wrote as follows to Dr. Mudge:

"On your postal report for the week ending February 6, I note, opposite bronchitis, influenza and tonsillitis '0,' from each of these diseases you run down a line to 'la grippe, 20 cases.' In the remarks you say: 'These diseases are often found as a *part* of some other conditions.' I assume that you saw one case or more of bronchitis, and of tonsillitis, which you assume were caused by the germ of la grippe, or whatever causes la grippe. I wonder whether medical science has progressed so far that this assumption is proper to be made. It seems to me that it would be better—we would learn more—if the exact conditions were reported, without assuming to know that the bronchitis or the tonsillitis is caused by the germ of la grippe. If I am right in this, then each case of bronchitis should be reported as bronchitis, and each case of tonsillitis should be reported as tonsillitis. At the same time, if you believe that any of these localized inflammations are caused by the influenza germ, or whatever causes influenza, that statement should be made on the margin of the card.

"La grippe is the French name for a disease which was long ago named by the Italians 'influenza.' I think influenza is the best name for the disease."

In reply to the secretary's letter, February 13, Dr. Mudge wrote:

"Yours of the 12th instant at hand and contents noted, which, with your forbearance, I will reverse in regular order and answer or deal with the last first. * * * First, I thank you for your explanation of terms just as much as though I had not been familiar with the same almost all my lifetime, used to teach languages, besides became especially familiar with these terms years and years ago both in prose and poetry—as for instance:

'If you are running at the nose
'With awful fits of sneezing.
'Cold chills running up and down your back
'As if your spine were freezing;
'If in a rocky, nervous mood.
'Like one in a drunken frenzy,
'Beware, my friend.
'You have the French la grippe,
'Or the Russian (not 'Italian') influenza.'

"Now it is a fact that poets sometimes get closer to an idea with less words than it seems possible for prose writers to do, and I make this quotation as explanatory in part to the general abstract condition or symptoms of a patient with the so-called la grippe, before entering upon a discussion which your short letter calls out and for the which I feel to thank you, for while it is kind it yet leans toward criticism enough to call out a *defense* on my part if I *can* and if not *then*, and perhaps anyway, I've learned something.

"Now you speak of 'the germ' of la grippe. While I had a special course in the U. of M., under Prof. Stowell in the study of normal and pathological histology (microscopic) under which we pursued the *then* germ theories quite thoroughly, and have since aimed to keep them quite well read up and am in sympathy with many of them, as for instance I believed it helped in settling the diagnosis in Iron Mountain, Michigan, in the epidemic reported in State Board of Health Report of 1887. The drinking water was sent to the U. of M., where the specific germ of typhoid was found which reproduced similar lesions in the cat and the ptomaine was formed by the growth of this germ.

"Notwithstanding all these and many other reasonable things—there is a world of ideas come up and group about these investigations. For instance, is it the special germ that *produces* a particular disease, or is it a particular disease that fosters the growth of a special germ?

"Again after these general considerations of the possible *germ* cause of this so-called la grippe or any other disease—let us think of our special subject, la grippe, with its many and varied symptoms, for a few moments.

"First as to possible *cause*. Our present winter, the cold weather commenced very severe and very suddenly, and has thawed enough by times to allow evaporation to take place. Then again followed by extreme cold to cause sudden condensation, thus tending to keep the air loaded with dampness, causing one's clothing to become damp, allowing a rapid escape of animal heat from our bodies, whereas if the air had remained *steady* cold it would have become and remained dry. Then again the extreme cold has caused people generally to keep more fire in their stoves—to which they, the people, would rush for protection against the cold, and there breathe the dry heated air into their lungs, tending to dry up the natural excretions of the mucous membranes of the air passages, rendering said mucous surface tender and already irritable—*then* they would go out suddenly into extreme cold, damp air, and here we have the cold (absence of heat) and the *dampness*, both being elements or conditions suitable to suddenly extract the heat from the body, and cause congestion of the mucous membranes. Then again we have errors in diet, improper clothing and from all the above sources we get a chilling of the body, a checking of the natural secretions and a consequent impairment of the circulatory equilibrium, a congestion of the internal organs and a resulting disturbance of the nervous system, and, of course, faulty digestion.

"So much for what seems to me to be a reasonable cause. Now to these '20' cases of la grippe involving (more or less of them) the bronchi, tonsils, and in fact the whole respiratory tract as well as the whole system directly or indirectly.

"As *this* means inflammation of, I take it that if the tonsils are involved in an inflammatory process (even though they do not supurate) we must have tonsillitis, and the same may be said of the bronchi, bladder, or any other organ or part of the body. Now then to illustrate, a wheel of course is a wheel but it is only a *part* of a carriage; even so the inflammation of the tonsils and bronchi in a case of la grippe or influenza is only an expression showing one part of many which is involved in the case of a disease whose effects are widespread and general, while to confine the name to the more local disease if the latter as it may not be only local in its immediate effects would but partially signify the real condition. It in my judgment is too much like dogmatically classifying the various forms of sore throat, as angina faucium, angina uvularis, angina pharyngea, angina tonsillaris, etc., which is anything but practical, because one rarely if ever finds a single part of the throat inflamed as the books are too apt to teach.

"I prefer giving the various forms of sore throat a name either in accordance with their various *causes* or from the nature of the pathological process, as phlegmonous, aphthous, diphtheritic, catarrhal, gangrenous, etc.

"This name influenza, I like for these cases, although I consider it, influenza, nothing more than a violent catarrhal fever and is distinguished from other fevers of this class by the whole nervous system being affected at once, especially with rheumatic pains, with inflammatory symptoms, being epidemic in character.

"About sixty years ago in Europe, in my judgment there occurred an epidemic the most like what we are now having than has occurred in any reliable history of the disease.

"Finally, I'll call these la grippe cases influenza, and if there are bronchial and tonsillar complications shall I report them separately as such?"

Februray 15, 1897, replying to Dr. Mudge's letter, the secretary wrote:

"Accept my cordial thanks for your letter of Feb. 13, relative to influenza. It is only by comparison of views from time to time such as this correspondence with you affords, that this office will be enabled to study the sickness statistics intelligently. The same mail which brought your postal card brought another from one of our observers showing that he too reported as influenza diseases which in years past would have been reported bronchitis, pleuritis, and inflammation of the kidneys. I note what you say about preferring to report the cause, or, as you express it, the entire 'carriage' instead of separating the several 'wheels.' I believe that is the general tendency of the profession today, and that our sickness statistics are going to continue to show very much more influenza than heretofore, and very much less of the several local inflammations which in past years have been reported, and not considered to be a part of influenza.

"You say, 'Finally, I'll call these la grippe cases influenza—and if there are bronchial or tonsillar complications shall I report them separately as such?' If you report these cases as influenza it will add to our knowledge of the subject if on the margin of the card you would note the number of cases of each of the several local inflammations, stating the number of cases of bronchitis, tonsillitis, etc., which you include in the influenza. Another way would be, as suggested in my previous letter: Report each disease or localized inflammation, and write in the margin of the card that these cases are due to and a part of the influenza."

PNEUMONIA, A SEQUELA OF INFLUENZA.*

In April, 1897, the following interesting letter was received from H. C. Edwards, M. D., Health Officer of Elkland Township, Tuscola County, relative to an outbreak of la grippe in his jurisdiction, each case of which was followed by pneumonia:

"Yesterday afternoon Dr. Morris of Gagetown, Michigan, called me in the interest of the Board of Health of Elkland Township to see a sick family, one and one-half miles from Gagetown, but in Elkland Township. The history of sickness was:—About the middle of January, 1897, the mother of family was taken ill with la grippe and in two weeks died from pneumonia (in left lung); since then six of the family have been taken down with the disease, each beginning with the typical symptoms of la grippe and developing pneumonia of left lung the third day. Each has had the inflammation in his left lung except one, whose right lung was inflamed. There have been no deaths since mother's. Three are convalescent, three are in bed. There are three remaining members in the family, one of which shows some symptoms of a beginning of attack. Two girls and six boys in family. The father 50 years old is sick with same trouble. The surroundings seem to be healthful. House a small, new frame, is located on a hill, and isolated from barns, or out-buildings. The family get drinking water from twenty-eight foot artesian well. Are not filthy in their habits. The doctor asked me to quarantine them. As I understand it, we get no authority to quarantine either pneumonia or la grippe. There is no evidence of typhoid in any of cases now in bed. If you advise a quarantine, could nurse and food bills be collected from county? A prompt advice from you will be appreciated."

In reply to Dr. Edwards' letter, April 10, the secretary wrote:

"Your letter relative to pneumonia is before me, for which please accept thanks. Relative to isolating cases of pneumonia and of la grippe, while this Board has for purposes of general education placed those diseases in the list of dangerous communicable diseases, yet they have not been considered by the people generally 'diseases dangerous to the public health,' and have not been formally placed in that list by the State Board of Health. Therefore I have some doubt about your collecting a bill from the county for nurse and other necessary expenses, providing you should order the isolation of the cases, as in other diseases which have been declared to be 'diseases dangerous to the public health.'"

DYSENTERY IN ALMONT, MICHIGAN.

In his postal-card report to this office for the week ending October 30, 1897, D. H. Burley, M. D., Health Officer of Almont Village, Lapeer County, stated that he had 28 cases of diarrhea and ten cases of dysentery under his observation.

November 2, the secretary of this Board wrote to Health Officer Burley as follows:

"On your postal report for the week ending October 30, you report as under your observation during that week 28 cases of diarrhea and 10 cases of dysentery. This is of such interest that I wish you would have the kindness to write me full particulars. Is the diarrhea confined to children? What is the apparent cause. Is the dysentery due to amebæ? If so, can you trace the origin?"

November 10, in reply to the secretary's letter, Health Officer Burley wrote:

*There were no special or final reports on pneumonia in the year 1897 received at this office.

†"Such dysentery has, apparently, been traced to drinking water containing leachings from infusions of straw. Is there any evidence of this nature? Is there any evidence that it is caused by cider leached through straw? If microscopical examination for amebæ has not been made, I trust it will be done at once, and effort made to trace the disease to its source."

"In reply to yours of Nov. 2, I have made a careful examination in nearly all cases, and find the trouble due to bad water. The microscopical examination shows amœbæ in nearly all the samples of water. I have had them boil the water and clean out the wells with good results."

November 12, the secretary again wrote, as follows, to Health Officer Burley:

"Accept my thanks for your letter of Nov. 10.

"If, as you say, nearly all the samples contain amœbæ, it is exceedingly important information. I wish you would send me, as soon as possible, a sample of the well water containing amœbæ.

"It is also exceedingly important that the mucus passed by those having dysentery be examined for amœbæ. I trust that you will do this, and, if you find them present, that you will place some of the mucus containing amœbæ in a clean sterilized bottle, and send it to me by express.

"There is an opportunity here to do some scientific work of much more than ordinary importance."

November 15, Health Officer Burley replied as follows to the secretary's letter:

"Yours of 12th, to hand. I am unable to send you a sample of the well water which contained amœbæ as the wells have all been cleaned out and I did not save a sample of any of the water or any of the slides which I prepared.

"If I should at any time again find any germs of any importance will forward them to you at once."

INTERMITTENT FEVER IN ANN ARBOR.—MALARIAL GERMS PRESENT.

July 5, 1897, T. L. Chadbourne, M. D., Demonstrator of Clinical Medicine at the University of Michigan, wrote to the secretary of this Board relative to this subject as follows:

"Is the State Board of Health interested in knowing of the occurrence of malaria in Ann Arbor? If so I shall be glad to send facts concerning case of tertian in which the plasmodium was demonstrated."

In reply to Dr. Chadbourne's letter, the secretary informed him that he (the secretary) and the members of this Board were interested in malaria in Ann Arbor, and would be glad to have the facts concerning a "case of tertian in which the plasmodium was demonstrated," and to learn whether the case was contracted in Ann Arbor, and how the plasmodium was introduced into the body.

July 23, 1897, Dr. Chadbourne again wrote to the secretary as follows:

"I have had your letter concerning the malaria for some time, but am today, for the first time, able to answer it. I enclose some notes concerning the case of ague that we examined. Your inquiries as to whether the disease was contracted in Ann Arbor, and how the organisms were introduced into the body, can hardly be answered definitely. As to the first, however, it seems not improbable that the patient may have acquired the illness here."

Following is a copy of the notes mentioned above:

"Mr. R—, a senior medical student, in August, 1895, had an attack of tertian malaria while he was on the lower Mississippi. The attack was cured by quinine. He came to Ann Arbor in October, 1896, and has not been out of town since. Has been in good health during the entire year till his present illness.

"May 18, 1897, patient had a moderate chill with fever and sweat. On the 20th again chill with temperature going to 105°, and marked sweat. At this time I was first seen, and the attack was so characteristic that the blood was at once examined. We were probably a little late, and while one or two suspicious bodies were seen no definite diagnosis was made. The patient was requested to abstain from quinine that the blood might again be examined. This he did and on two further occasions, May 22 and 24, the blood

was carefully examined and many parasites found, and on this latter date demonstrated to a large class.

"The organisms found were of the large tertian variety containing much pigment in active motion. None of the very young forms were found, but from those about six hours old both adult forms filling the corpuscle many stages were observed. A few were seen to bud. No distinct forms were seen. The blood count was: reds, 5,000,000, whites, 5,000. Fleischl, 85-90%.

"The interest of the case lies in the rarity of malarial fever in this locality. Although the members of the medical staff of the University Hospital in the last five years have examined many cases for malaria, with one other exception the examination has always been negative and the further history has shown the cases to be tuberculosis, sepsis, leukemia, etc. I have this spring heard of two or three cases where the clinical history seemed to point to malaria, but have been unable to get blood for examination. The exception in the series of negative examinations referred to above had to do with a young man who recently came from a malarious region.

"So that, notwithstanding the especial care with which malaria has been looked for during the past few years by Professor Dock and the members of his staff, this is the second time that the organisms have been found. From the long time that the patient had been continuously in Ann Arbor, it is at least likely that the disease was acquired here, and that genuine malaria still lingers, to some extent, in this locality. It is interesting to note that a new road was opened almost in front of the house occupied by the patient just before his illness. A good deal of filling in was done with refuse from alleyways. Careful inquiry failed to show any illness among the workmen on the road."

BOY INSTANTLY KILLED BY ELECTRICITY.

"The Soo Democrat," of July 22, 1897, published at Sault Ste. Marie, contained the following paragraph:

"The accident by which the boy met his death is the most horrifying one which has occurred in the city for years. The instrument of death was a wire which hung from an electric light pole near the corner of Ord street and Portage avenue and which had formerly been used as a supporting guy for the trolley wire of the electric street railway. The children of the vicinity had been in the habit of playing with the swaying wire, but before the day of the accident it had been hanging free of the electric light wire attached to the same pole. It appears that in some way the wire had been thrown across the electric wire and swaying with the wind had worn through the heavy insulation and had come in contact with the live wire, making it an engine of death for any one who should grasp it while standing on the ground. Friday evening Geo. Doan and Wm. Colless, a younger boy, were passing the swaying wire on the way to one of their playgrounds near the river. The Colless boy was ahead and he had barely crossed the sidewalk near the pole when a cry of agony from the lips of his playmate caused him to turn in time to witness the death throes of the Doan boy entangled in the wire.

"While crossing the street and just before reaching the sidewalk the Doan boy had thrust his arm through a loop at the end of the wire and the electric fluid passing through his body, killed him almost instantly. The Colless boy saw the smoke arising from the body of the prostrate boy and thinking he was accidentally afire ran to his assistance. No sooner had he touched the boy than he was struck senseless by the shock and received as well several painful burns.

"Henry Bonno, who was working near by, ran up and extricated young Doan from the wire but he was dead before help could possibly have reached him. It was found that the flesh on the boy's body was burned to a crisp in several places and that his left arm which had been encircled by the loop in the wire was almost burnt off at the elbow. The Colless boy was resuscitated only after several hours of hard work by his parents and a physician. He is now, with the exception of the burns received, entirely recovered. The accident has shocked the entire community by reason of its horrifying details."

In view of the increasing use of electricity, and the consequent multiplication of connecting wires strung in our streets, great care should be taken by all persons to avoid contact with any of such wires as may accidentally come within reach; and especially should the danger of touching such wires be impressed on the minds of children.

Restorative treatment of persons electrically shocked by artificial respiration is described in a pamphlet publication of this Board, entitled "Treatment of the Drowned, Suffocated, or Electrically Shocked"—which is published for distribution throughout the State, as a life-saving measure, and copies of which may be had by application to the secretary of this Board.

TINEA SYCOSIS (BARBER'S ITCH).

The following communication was received at this office from F. McD. Harkin, Health Officer of Marquette, relative to an epidemic of Tinea Sycosis, in that city, in 1897:

"Tinea sycosis became epidemic here and cases were reported from mostly every shop in town. Twenty-five or thirty cases occurred when adoption of the rules for barbers (sent under separate cover) stopped the evil in a week or ten days.

"It seems to me it is something of a new departure, and I thought you might be interested."

February 17, 1897, the secretary replied to Dr. Harkin's letter as follows:

"Your letter of February 10, relative to tinea sycosis, and the regulations relative thereto, are before me, for which please accept cordial thanks.

"This disease has been quite widespread over the State.

"If you have any of those barbers' regulations in smaller form, I would like a dozen of them."

The rules referred to in Dr. Harkin's letter are the "Barbers' Sanitary Rules" for the city of Marquette and read as follows:

BARBERS' SANITARY RULES.

Being section one of ordinance regulating the sanitary condition of barber shops, adopted by the common council of the city of Marquette.

The city of Marquette ordains:

Section 1. That the following rules and regulations for the guidance, continuous observance and practice of barbers in the city be and they are hereby adopted and prescribed, and copies thereof to be furnished by the health officer shall be kept conspicuously posted in each and every barber shop by the proprietor or person in charge thereof.

RULE I.—Each and every barber while practicing his trade shall keep his hands in a sanitary condition by paring and cleaning his finger nails and washing his hands immediately before any operation incident to his trade upon any person, in one of the following solutions: Mercury bichloride, one part to two thousand parts of water; or carbolic acid or creoline, thirty drops to a pint of water.

RULE II.—Each and every barber shall immediately before every cutting operation incident to his trade performed by him disinfect all razors, clippers, scissors and other tools used in such operations by dipping the cutting portions of such instruments in a bath of undiluted carbolic acid and then washing the whole instrument in either the carbolic acid or creoline solution specified under rule one above, and drying the same upon a towel specially reserved for such purpose, and shall disinfect all strops, combs and brushes immediately before each use thereof by washing the same in undiluted alcohol or in the creoline or carbolic acid solution specified under rule one above.

RULE III.—No barber shall use upon or about any person being operated on by him any towel or napkin which has been used on or about any other person unless since such former use the same has been thoroughly cleansed and sterilized in boiling water.

RULE IV.—No barber shall apply magnesia, alum, bay rum or other toilet dressings or applications to the head, face or neck of any person except by means of powder blowers or atomizers.

RULE V.—Before each and every shaving of any person by any barber, he shall thoroughly scald with water at the boiling point any soap cup or lather dish used therefor.

RULE VI.—No barber shall use for shaving any person, any soap, cup or dish, kept for public or promiscuous use unless there shall be kept for use therewith, and only used therewith and alternately, at least two lather brushes, and which brushes shall, while not in actual use, have been kept continuously in a bath of carbolic or creoline solution of the strength specified under rule one above, or in a bath of undiluted listerine, nor use on any person any lather brush not kept for the exclusive use of such person unless the same has been kept and thoroughly soaked in any such bath in this rule mentioned.

POISONING BY PRESSED BEEF AND SAUSAGE.

Poisoning by Pressed Beef, in Durand Village.

The Owosso Evening Argus of June 26, 1897, contained the following news item:

"Durand, June 26.—Great excitement was created over a case of poisoning, yesterday. John Pettit and three men who were working for him were suddenly attacked with convulsions, and it required great effort on the part of physicians to save their lives. They obtained relief in time, but are yet sick, and cannot expect to fully recover for several days. They had eaten heartily of canned beef, which must have poisoned them."

The above-quoted item having come to the knowledge of the secretary of this Board, he wrote, June 30, to G. H. Perrin, M. D., Health Officer of the village, asking him for a full statement of facts relative to the subject.

In reply to the secretary's letter, July 2, Dr. Perrin wrote:

"Relative to the poisoning of John Pettit and three others, I will say that it was caused by eating pressed beef and pork purchased at Swartz Creek, the article being made in that town. It was left out of the cooler one afternoon and evening. I understand there were others afflicted in a similar manner at Swartz Creek. The entire lot recovering."

Poisoning by Sausage in Bay City.

Information relative to this poisoning having reached this office, July 23, 1897, the secretary wrote to Dr. F. E. Ruggles, Health Officer of Bay City as follows:

"The Detroit Journal of July 22 contains the following:

"Bay City, Mich., July 22.—(Special)—Edward Thompson, his wife and three children were poisoned last night by eating sausage. Prompt medical attendance saved their lives."

"I would be glad to receive from you as full an account of the poisoning as you can possibly give, and enclose a stamped envelope for your reply."

In reply to the secretary's letter, July 26 Dr. Ruggles wrote:

"In answer to yours of 23 inst. regarding Edward Thompson and family who were poisoned. I learned from the attending physician that it was probably due to eating of a smoked sausage, called summer sausage, bought of a local dealer, but made in Chicago. It was probably ptomaine poisoning. Symptoms, purging, vomiting and great prostration. All recovered."

HOGS FED ON DEAD ANIMALS.

April 8, 1897, G. A. Ligiman, Health Officer of Ithaca Village, wrote to the secretary of this Board as follows, relative to this subject:

"Our meat market men here are in my opinion feeding the people on a questionable quality of *pork*. They take to the slaughter-house where they have a number of hogs, all the cows that die, and feed them, then kill and sell. What do you think about the meat being fit for food? If you think it bad, what is the prevention? Do you know of any law that would put a stop to the practice?"

April 14, in reply to Health Officer Ligiman's letter, the secretary wrote:

"Replying to your letter of April 8, relative to the pork being sold for food, I have written the Dairy and Food Commissioner, Hon. E. O. Grosvenor, of Lansing, giving him a copy of your letter. It seems to me that department should have jurisdiction.

"Such practices can be stopped by framing and publishing under Sections 1636 and 1639, Howell's Statutes, *rules and regulations* which have the force of law. I hope your village board of health will do so immediately. It would seem to me that pork made from hogs fed upon the dead bodies of other animals would not be fit for food for human beings. I shall be glad to know what has been done in this case. Kindly write me."

On the same date (April 14) the secretary wrote to Hon. E. O. Grosvenor:

After having given copy of G. A. Ligiman's letter, the secretary continued:

"It would seem to me that if there is no law for the protection of such food, there ought to be some provision whereby such practices could be stopped. Can not your inspectors do this?

"I shall be glad to have you take any action you can in the premises and shall be glad to have you write me on the subject."

In reply to the secretary's letter, April 16, 1897, Commissioner Grosvenor wrote:

"It seems to us entirely beyond the jurisdiction of this department to take cognizance of the matters to which you refer. If, in any way, we can aid you in the matter, of course we shall be very glad to do so.

"From a personal knowledge, I can see nothing in the law which would allow us to correct that villainous practice."

Later the following circular was issued from this office:

PORK FED ON BODIES OF DEAD ANIMALS.—NO LAW AGAINST THIS IN MICHIGAN.

The Secretary of the State Board of Health has received complaint from a village in Michigan that pork is being sold there which has been fattened on the bodies of animals which have died. Similar instances in previous years have been published in the reports of the State Board of Health. It is regretted that there is no State law which will stop this villainous practice and imposition on the people. Would it not be well if the present Legislature would make provision whereby the inspectors of the Dairy and Food Commissioner's office could be immediately sent to investigate and to commence prosecution against such offenders?

DISEASED ANIMAL FOR MEAT.

January 21, 1897, C. Hamilton, M. D., Health Officer of Cascade Township, Kent County, wrote as follows, to the secretary of this Board:

"I was called upon yesterday to examine an animal which had been slaughtered and to pronounce upon the nature of the trouble and to say whether or not the meat was fit for market. The disease was located in the peritoneum and between the folds of the bowels there was a large abscess. The trouble was undoubtedly tubercular peritonitis with the formation of an abscess following the breaking down of the glands.

"I have condemned the meat and am keeping it awaiting your orders for disposal of the same. There was another animal in the same herd of cattle which died last summer. I was unable to ascertain the nature of the cause of death.

"Will you please take whatever steps you deem necessary and also inform me whether the butcher or the previous owner of the cow is responsible for the loss or whether the State will make good the amount?"

In reply to Dr. Hamilton's letter, January 22, the secretary wrote:

"Your letter of January 21, relative to the carcass of a diseased animal, is before me. I have sent a copy of your letter to Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Michigan, with the request that he reply to your letter.

"In the meantime I think you should give your orders for the meat not to be sold. Section 9316, Howell's Statutes, reads: 'If any person shall knowingly sell any kind of diseased, corrupted, or unwholesome provision, whether for meat or drink, without making the same fully known to the buyer, he shall be punished by imprisonment in the county jail not more than six months, or by fine not exceeding two hundred dollars.'

"It would seem to me that meat from such a diseased animal as you mentioned would be dangerous to the public health, and should certainly not be sold for human food. The loss will probably go back to the owner; however, this question will probably be answered by Mr. Hinds. I am not a lawyer, and do not like to decide the question."

ACTINOMYCOSIS (LUMP-JAW) IN MICHIGAN IN 1897.

Actinomycosis was reported to the Secretary of the State Board of Health during the year ending December 31, 1897, from two localities in Michigan—Austin and Sanilac Townships, Sanilac County.

Secretary Baker wrote to the local health officers that he had reported the matter to Hon. H. H. Hinds, President of the State Live Stock Commission, but that it was the duty of the local health officers and boards of health to care for the human beings; and urged upon them the necessity for restrictive measures, as he understood that the disease was communicable to man as well as to animals, conveyed by eating diseased meat, etc. As the disease is a specific parasitical disease, care should be taken to prevent its spread; and that he did not think it would be judicious to use the milk from an infected cow.

RABIES IN MICHIGAN IN 1897.

During the year 1897, rabies was reported to this office from two localities in Michigan: Livonia Township, Wayne County; and Litchfield Township, Hillsdale County:

Details relative to outbreaks of rabies, will be found in the following extracts from the correspondence of this office:

Rabies in Livonia Township, Wayne County.

July 10, 1897, a letter was received at this office from Mr. J. Le Van, Health Officer of Livonia Township, Wayne County, which reads as follows:

"A mad dog has passed through our neighborhood and bitten a number of dogs, hogs and cattle. I have ordered the killing of all [bitten animals] on the route he took. He was followed and killed. One hog and five dogs have gone mad.

"There is one man will not kill his dog, what is my duty as health officer? I would like you to give me the law and just how far I can go and not exceed my duty as health officer."

On the same day the following letter was written from this office to Health Officer Le Van in reply to his inquiries:

"Please accept thanks for your letter of July 16, relative to rabies. You should have also notified the State Live Stock Commission, if you did not. However, I have made a copy of your letter and sent to Hon. H. H. Hinds, President of State Live Stock Commission, Stanton, Michigan.

"Rabies is a disease dangerous to man as well as animals and should be promptly restricted by the health officer in accordance with act 137, laws of 1883. Relative to killing the possibly-infected dogs, I think you could do so, but would probably have to frame and publish (under Sections 1663 and 1639, Howell's Statutes), rules and regulations. Your rules can require that all dogs must be muzzled or killed if found without a muzzle, also the dogs suspected to be infected with rabies must either be securely isolated for at least two months or killed if found at large. I think two months would, in most, if not in all cases, be sufficient time to determine whether or not a dog is probably going to develop rabies. If a dog should show symptoms of rabies and it is not certain whether or not he has the disease, and it is not desirable to kill him, it is stated by the best authority that he will certainly die within ten days if he has rabies.

"In framing your rules and regulations I should certainly require muzzling of all dogs until October 1, and longer if necessary. I would also carefully frame the rules concern-

ing cattle and horses, animals with some value attached. It is practicable to isolate such animals and control them until it is known whether or not they will develop rabies.

"I send you by mail a copy of a publication of this office bearing on the subject of rabies, in which I have marked portions which will probably be of interest to you.

"I shall be glad to hear from you again on this subject, and to know what precautions have been taken by your local board of health for the restriction of the spread of the disease.

"I should also be glad to know in what other townships or villages the disease has occurred or is likely to occur."

Suspected Rabies in Litchfield Township, Hillsdale County.

August 23, 1897, there was received the following letter from W. H. Atterbury, M. D., health officer of Litchfield Township, relative to rabies in that locality:

"Last Friday evening a dog passed through our village, biting eight or ten dogs, and was killed this morning after biting four more. From reports animals seemed to show signs of rabies. What action is to be taken in cases of this kind?"

August 24, the secretary replied to Dr. Atterbury's letter as follows:

"Your letter of August 23, relative to rabies, is before me. You should have also notified the State Live Stock Commission. However, in this instance I have done so and have sent a copy of your letter to the Hon. J. J. Woodman, member of the State Live Stock Commission, Paw Paw, Michigan.

"Rabies is a disease dangerous to man as well as animals, and the local board of health should not fail to protect the lives of its citizens as well as the lives of its live stock. If the rabid dog had bitten a human being, it should not have been killed, until known definitely whether or not it had rabies. It should have been isolated for ten days. If rabid, it would have died.

"Your local board of health should have rules and regulations which would enable the health officer to act promptly for the restriction of such a disease. If your board has no such regulation, it should frame (under Section 1636, Howell's Statutes), and publish (under Section 1639, Howell's Statutes), rules and regulations which would enable the health officer to act promptly without delay of calling a board together. I send herewith a copy of our leaflet on the work of health officers, in which I have marked parts bearing on the subject.

"I send you by mail a publication of this office on rabies. I hope it may be of interest to you.

"All animals, especially dogs, bitten or suspected of being bitten, should be thoroughly isolated until after the period of incubation has passed. It would be well for your board to order all dogs muzzled for two months, or insist on the owners keeping their dogs tied up. I shall be glad to know how many human beings were bitten, how many animals, and whether or not the animals suspected of being rabid were killed? Did the outbreak extend over more than Litchfield Township? If so, will you kindly give me the names of the townships, cities or villages in which the outbreaks occurred that I may correspond with the health officials of those jurisdictions?"

No further communication was received at this office relative to this subject.

GLANDERS IN MICHIGAN IN 1897.

During the year ending December 31, 1897, there were reported to the Secretary of the Board of Health, nine cases of glanders in horses (three of these cases were reported as "suspected" glanders) in seven localities. These localities were: Coldwater City, Branch County; Charlotte City, Eaton County; Saginaw, E. S., Saginaw County; Sherman Township, St. Joseph County; Geneva Township, Midland County; Mancelona Village, Antrim County; Brookfield Township, Eaton County, two suspected cases, and one suspected case in Belding City, Ionia County. In the cities of Coldwater, Charlotte, and Saginaw, the diseased horses were killed to avoid spreading the contagium.

MANGE IN ITHACA VILLAGE.

During the year 1897, two outbreaks of mange in Ithaca Village were reported to this office, in which one woman and several hogs were affected with the disease. The following are extracts from correspondence relative to these outbreaks:

January 11, 1897, G. A. Ligiman, health officer of Ithaca Village, wrote as follows to this office:

"What can a health officer do in case of a diseased hog (brood sow) I think she has mange. Would pork bred from her be fit to eat? Have I a right to condemn and destroy? If I call a veterinary who pays the bill—the village or the county?"
 "Please give me all the information you can."

In reply to the health officer's letter, January 12, the secretary wrote:

"While mange in itself would not probably affect the meat of the hog, except the skin, mange might, after some time, cause the hog to be in such a run-down condition that the meat might not be the best for food; but as to its being dangerous, I would not think it would be dangerous, if cooked. I think, on the whole, it *would be better not to use the meat for food*. You might report the facts to Hon. H. H. Hinds, President of the State Live Stock Commission, which has charge of the health of animals. Mr. Hinds resides at Stanton, Michigan, and it is your duty to report to him in case you suspect a dangerous disease in animal. It is possible that the President of the State Live Stock Commission will visit Ithaca. If he does not, he may send the State Veterinarian. The State Veterinarian is paid by the State. I think, however, you can ascertain this information from Mr. Hinds. The health officer has no absolute control, but should act as adviser of his local board."

December 23, 1897, a resident of Ithaca Village, wrote to the secretary of this board substantially as follows relative to mange in that village:

"I bought nine pigs from Mr. M——— about two months ago and he told me they were all right only a little dirty. I thought it would improve them to give them a washing, and in return for my trouble caught what the doctor said was a very bad case of the mange; and I have not got over it yet, and the pigs have all died with the disease. * * *

"Mr. Oakes, and the veterinary surgeon, Mr. Freel, came and pronounced it a bad case of mange and told me to keep away as much as possible, and that he would take care of them. The pigs have been dead in the pen for a week, * * * and the neighbors complain that they smell bad.

"Pigs belonging to Mr. M——— have the disease, which the veterinarian has examined and pronounced a bad case of mange."

December 23, the secretary wrote as follows to Henry Oaks, health officer of the village:

"Mrs. L. B. of Ithaca writes this office concerning mange that is epidemic among hogs, and seems to be very contagious, and somewhat dangerous to man as well as animals. The local board of health should protect the lives and health of its citizens, and it is your duty to act under act 137, laws of 1883, for the protection of the people; until the State Live Stock Commission relieves you. I have written Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Michigan, concerning the outbreak. I presume he will investigate."

December 24, in reply to the secretary's letter, Health Officer Oaks wrote:

"Your letter dated the 23d at hand, and in reply will say, that when the case of mange was reported to me I took charge of it, and reported the same to the State Veterinarian, and the letter got mislaid in some way, and it was some time before it reached Mr. Hinds.

"Mr. Hinds was here yesterday, and left the case with me, and it has been taken care of, and there is not any more danger in the case. The hogs are taken care of."

HOG-CHOLERA IN MICHIGAN IN 1897.

During the year 1897, the presence of hog-cholera in four localities in Michigan was reported to the office of the State Board of Health as follows: Port Huron City, St. Clair County; Vermontville Village, Eaton County; Akron Township, Tuscola County; Thetford Township, Genesee County. The exact number of hogs attacked by the disease in these localities was not given.

In each instance the care of the outbreak was referred to the State Live Stock Commission.

COWS MADE SICK BY RIVER WATER.

September 16, 1897, J. E. Bennett, M. D., health officer of Nankin Township, Wayne County, wrote to the secretary of this Board as follows, relative to sewage contamination of Rouge River:

"The Rouge River below the Wayne County House is in a very unsanitary condition, due to the sewage from the institution running in. Mr. Murdock, a farmer living down the river, has found a good deal of fault on account of his cattle being obliged to drink the water from the river, claiming it makes them sick.

"I believe the milk or butter from such cows not fit to drink or eat, and he is selling milk in Detroit. Thought it was best to inform you. He has been consulted about the matter and is willing to do the right thing."

September 20, replying to Health Officer Bennett's letter, the secretary wrote:

"Please accept cordial thanks for your letter of September 16, relative to condition of River Rouge. I have sent the health officer of Detroit a copy of your letter for any action he may see fit to take.

"Will you kindly investigate and report the exact facts in the case? Have the cows of Mr. Murdock actually been sick? If so, how were they affected? Is there any other way you can suggest that the sewage can be disposed of, other than putting it into the river? If so, how? Is the unsanitary condition of the river all due to sewage from the Wayne County House?

"Will you kindly give any other information you may think bears on the subject?"

On the same date (September 20) the secretary sent a copy of Health Officer Bennett's letter to Dr. Duffield, health officer of Detroit, for any action it might be thought best should be taken in regard to the subject.

ALLEGED NUISANCES IN MICHIGAN IN 1897.

During the year 1897, communications relative to fifty-three alleged nuisances were received at the office of the State Board of Health, from fifty localities in Michigan.

The causes to which the alleged nuisances mentioned in these communications were attributed, may be classified as follows:

Hog pens, cattle yards, stables, etc., 10; slaughtering and slaughter houses, 2; unsanitary conditions of premises, etc., 4; low lands and marshes, etc., 6; dams in rivers, mill ponds, etc., 5; privies, cesspools, etc., 10; pomace, 1; drains and drainage, 2; fish offal, 2; sewage and contamination of water supply, 2; night-soil, manure, slops, etc., thrown on ground, 6; drippings from Chemical works, 1; asphalt factory, 1; a person of filthy habits, 1.

Whenever complaint of an alleged nuisance is received at this office, the president of the local board of health whose duty it is to act, is usually informed of the nature of the nuisance, and is requested to investigate the same. At the same time sections of law, and pamphlet publications of this Board, pertaining to nuisances and to the duties of local boards of health relative thereto, are sent to him, and also to the person making complaint. Two regular forms of letters are used for this purpose, copies of which are printed on pages 458-9 of the annual report of this Board for 1897. The first is sent to the person making complaint of the nuisance, the other is sent to the president of the board of health of the locality where the nuisance is reported to exist.

As compared with the preceding year, there was an increase of eighteen in the number of nuisances reported to this office in 1897.

In articles on alleged nuisances, published in previous annual reports of this Board, attention was called to the fact that a large proportion of the communications received at this office in regard to alleged nuisances came from local health officers and other township, city and village officials, asking for information relative to points of law concerning nuisances, or requesting advice as to their duties, or to the proper legal procedure necessary to effect the prevention or abatement of nuisances. The correspondence of 1897 shows a desire on the part of the local health officials for advice and coöperation of this Board, which has been freely and cheerfully given, and it is believed with beneficial results to the public health.

The State Board of Health has no authority to enforce or order the abatement of a nuisance. Its powers in this respect are advisory. And while the Board is willing to render such advice as it may be able to give on any subject, it is often the case in regard to nuisances that prosecuting attorneys, or other lawyers, on the ground and acquainted with the facts, are in better position to give legal advice than is the State Board of Health. The State Board of Health is always glad to learn of the efforts of local boards to abate nuisances, and what success attends those efforts, and solicits correspondence upon this subject. It cannot, however, under-

take to do for local boards that which the law has so well provided for their doing for themselves. In showing them how they can help themselves it really does more for them than to do their work; for when the local board has mastered the situation and removed a nuisance, it has secured a vantage ground which a distant authority could not so well secure and hold.

The following extracts from the correspondence of this office relative to the above-mentioned alleged nuisances in 1897, show the nature of some of those nuisances, and the action taken and recommended to be taken in regard to them by the secretary of this Board.

HOG-PENS, CATTLE YARDS AND STABLES, ALLEGED NUISANCES.

Stable in Tustin Village an Alleged Nuisance.

April 5, 1897, complaint was made to this office by a resident of Tustin Village that a barn on certain premises in said village was detrimental to health, was therefore a nuisance, and should be removed.

April 6, 1897, the secretary of this Board wrote to the complainant as follows:

"Your letter of April 5 relative to an alleged nuisance in the village of Tustin, * * * is before me. This is a subject for the consideration of the *local* board of health, which in your village is probably the president and village council. You should place the complaint before the local board of health, which is required by law to examine into the subject."

Relative to this alleged nuisance, Dr. Sid Conover, health officer of Tustin Village, wrote to the secretary, April 8, as follows:

"Can a person be compelled to move a barn because it is within twenty-four feet of a dwelling house owned by second party? The barn was built before the house. The fact of the matter is the barn obstructs the view towards town and that is the only reason I can see for its removal."

In reply to Dr. Conover's letter, April 14 the secretary, wrote:

"I would not think that a barn because of being within twenty-four feet of a house was necessarily such a nuisance as to be injurious to the public health. But *its use might* be such as to make it so. However, this is a subject for the consideration of the local board of health."

Hog-pen in Stanton City an Alleged Nuisance.

April 12, 1897, William Gaddum and twelve other citizens of Stanton City, wrote to the secretary of this Board complaining that a feed barn and yards where hogs and cows were kept and which extended to within four feet of the residence of said William Gaddum, was, by reason of the stench arising therefrom, a nuisance, and requesting that the same be abated.

On receipt of the above-mentioned complaint the secretary wrote to the mayor of the city, who is president of the local board of health, advising him of the complaint made, and asking the attention of the local board of health to the subject.

April 27, in reply to the secretary's letter to the mayor, W. P. Gamber, M. D., health officer of the city, wrote substantially: That the attention of the health officials of the city had not been called to this alleged nuisance

before Mr. Gaddum wrote to the secretary on the subject; that immediately on receipt of the secretary's letter the mayor, a committee from the city council and the health officer, made investigation and found "four or five small pigs running loose in a large yard connected with the barn. There was now and then a fresh pile of cow manure in this lot. We immediately called upon Z. E. Briggs, the owner of said premises, and advised him to clean up this cow manure and to place a fence across this lot to keep the cows and pigs away from near Wm. Gaddum's house. Mr. Briggs said that as soon as the cold weather was over he would take the pigs to the farm and would remove the manure from the yard as soon as it thawed out."

Hog-pen in Eaton Rapids, an Alleged Nuisance.

May 22, 1897, C. A. Stimson, M. D., health officer of the city of Eaton Rapids, wrote to the secretary of this Board as follows:

"My attention has been called to a party who is maintaining what appears to me a very dangerous nuisance, in the way of keeping and feeding about one hundred hogs in the city limits.

"The owner of the hogs is quite a prominent citizen here and there is trouble ahead for the local 'board,' and we would like to have you come here and help us out some. It is our opinion that the offender would have a more wholesome respect for the authority emanating from the State office and if you can come here at once, you will render us valuable aid. Please let me hear from you immediately as the matter is serious."

In reply to Dr. Stimson's letter, May 25, the secretary wrote:

"Replying to your letter of May 22, relative to the alleged nuisance in your city, where there is a yard with about one hundred hogs, kept in a condition dangerous to the public health, this is a subject for the *local board of health*.

"The law makes it the duty of the local health officer to advise the local board of health. I trust you will advise the local board on this subject."

May 27, 1897, Adelbert McAllister, a resident of Eaton Rapids, complained to the secretary relative to this alleged nuisance.

May 28, 1897, the secretary, by letter, informed Mr. McAllister that the city officers were giving the subject attention.

June 2, Mr. McAllister again wrote to the secretary stating that no attention had yet been given by the local board to this nuisance, and urging the State Board to take measures for its abatement.

June 3, the secretary wrote as follows in reply to Mr. McAllister's second letter:

"Your letter of June 2, is before me.

"This office has no direct jurisdiction in the subject of nuisances. Section 1640, Howell's Statutes, requires the local board of health (the city council) to examine into all nuisances, etc., and destroy, remove, or prevent the same as the case may be.

"If the local board of health fails to act any person injured or annoyed thereby can make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance."

In September, 1897, this nuisance not having been abated, Mr. McAllister wrote to Governor Pingree requesting his aid in having it removed, and sent the governor copies of a petition signed by numerous citizens of Eaton Rapids addressed to the common council of the city requesting abatement of the nuisance; and also of a notice from the common council to the owner of the property on which the nuisance existed, directing him to remove the nuisance within twenty-four hours. This, however, the said owner refused to do.

The governor referred Mr. McAllister's letter and accompanying documents to the secretary of this Board for action if necessary.

September 14, the secretary wrote to the mayor of the city requesting the attention of the local board of health to the subject.

September 30, 1897, C. O. Markham, City Attorney, wrote to the secretary as follows:

"Your letter of September 14, to the mayor of this city in relation to the alleged nuisance maintained by W. Vaughan & Son, has been referred to me for a reply. During the time the people in the vicinity of that hog yard were complaining Mr. Vaughan promised to remove the hogs, and did sell about one hundred of them over six weeks ago, and has now disposed of all of them and thoroughly renovated the premises. The board of health were out there last night and pronounced everything all right. I do not think there will be any further complaint."

Hog-pen in Hillsdale Township, an Alleged Nuisance.

August 9, 1897, complaint was made to the secretary of this Board that a hog-pen near a residence in Hillsdale Township, Hillsdale County, was cause of foul odors which were a nuisance.

August 13, the secretary, by letter, referred the complaint to the president of the township board of health, who replied that the nuisance had been abated.

Hog pen in Roxand Township, an Alleged Nuisance.

September 19 and 20, 1897, complaints were received at this office from residents of Roxand Township, Eaton County, to the effect that a hog-pen situated near a residence in the unincorporated village of Mulliken was a nuisance.

September 23 the secretary wrote to the complainant as follows:

"Your letter of September 19, with petition, making complaint of the alleged nuisance caused by Thomas Hale keeping hogs in the village is received. This is a subject within the jurisdiction of the township board of health. You should make complaint to the supervisor of the township, who is president of the local board of health."

Hog-pens and Slaughter-house in Owosso, an Alleged Nuisance.

October 19, 1897, A. H. Northway, secretary of the board of health of the city of Owosso, wrote as follows to the secretary of this Board:

"We have a nuisance in the form of hog-pens and a slaughter-house just across the street from the city limits near the highway in a quite thickly-settled portion of the city. Our board of health think we have no jurisdiction over this matter and I reported it to the township board. They looked it over and so far as I can find, let it pass. It has been so bad the past summer that it was impossible to ride along the public highway without holding your nose and this evening another complaint was entered to me and I ask you for instructions in the matter."

In reply to Mr. Northway's letter, the secretary wrote explaining the legal procedure necessary to obtain abatement of the nuisance.

Hog-pen in Perrington Village, an Alleged Nuisance.

December 12, 1897, a resident of Perrington Village, Gratiot County, wrote to the secretary of this Board as follows:

"One of my neighbors has placed twelve hogs in a pen which comes within thirty or thirty-five feet of my well. I have spoken to him and he insists there is no danger of making the water impure. Will you please give the nearest distance from a well that a hog-pen might be kept with perfect safety to those drinking the water? The danger of

typhoid fever prevailing near by leads me to ask you for this information as a matter of protection to myself and family."

Replying to this letter, December 13, the secretary wrote:

"Your letter of December 12, relative to the hog-pen within thirty or thirty-five feet of your well, I would think this a *bad* situation for a hog-pen. My belief is that a hog-pen should be at least thirty yards from a well used for drinking water. It would be well to make complaint to the local board of health, as a nuisance."

December 28, the complainant, by letter, informed the secretary that the nuisance in question had been abated.

Stockyard in Brighton Village, an Alleged Nuisance.

December 12, 1897, a resident of Brighton Village, Livingston County, reported to the secretary of this Board that there existed within the corporate limits of said village, and not more than twenty feet from a well, the water from which was used for drinking, a stockyard where hogs, sheep and cattle were kept to fatten, and that said yard, by reason of foul odors, etc., emanating therefrom, was a menace to the public health and a nuisance.

December 13, the secretary advised the president of the village, who is president of the local board of health, of the complaint made and requested his attention to the subject.

December 15, in reply to the secretary's letter B. T. O. Clark, president of the village, wrote:

"I have your communication of the 13th in relation to complaint being made to your board relative to a certain stockyard in this village, and in reply desire to state, that, upon my personal direction as president, our health officer, Henry P. Ptolemy, M. D., investigated the matter and made a report thereon at our council meeting on December 2d, in substance, that the yard complained of (was not in any manner detrimental to the health of any person), that being the only safe guide we have to go by. I do not see how we could take any action to abate the same if it was not detrimental to health."

SLAUGHTERING AND SLAUGHTER-HOUSES.

Slaughter-house in Nankin Township, an Alleged Nuisance.

June 15, 1897, a resident of Nankin Township, Wayne County, complained to this Board that a slaughter-house situated within ten rods of a residence was, in hot weather, a nuisance.

June 26, 1897, the secretary advised the president of the local board of health of the complaint made and suggested that this case might come under Section 1682, Howell's Statutes, which forbids maintaining a slaughter-house within twenty rods of a highway.

Slaughter-house in Palmyra Township, a Alleged Nuisance.

July 20, 1897, complaint was made to the secretary of this Board that a slaughter-house in Palmyra Township, Lenawee County, was by reason of foul odors arising therefrom, a nuisance.

July 22, the secretary, by letter, advised the president of the local board of health of the nature of the complaint made, and continuing wrote:

"Section 1682 of Howell's Statutes provides that no slaughter-house shall be maintained within twenty rods of any public highway, or in any other place except as provided in Section 1678 of Howell's Statutes, which provides that the township board of every township may assign certain places for the carrying on of offensive trades, and said board may revoke such assignment when they may think proper. I trust that you will give the subject your immediate attention, as the public health interests of your township should be paramount to every other subject."

UNSANITARY CONDITION OF PREMISES.

Unsanitary Condition of Schoolhouses in Alpena City.

July 22, 1897, Nelson M. Eddy, president of the city board of health of Alpena, wrote to the secretary of this Board, stating that the schoolhouses of said city were in an unsanitary condition, and enclosed a report made by a committee of the local board of health appointed to investigate this subject. Mr. Eddy asked the advice of the secretary relative to the subject and desired to be posted "in regard to the law regulating these matters referred to."

In reply the secretary complied with President Eddy's request.

Filthy Condition of Pickford Village, an Alleged Nuisance.

August 15, 1897, a resident of the unincorporated village of Pickford, Pickford Township, Chippewa County, complained to the secretary of this Board that said village was in a bad sanitary condition.

August 16, the secretary, by letter, informed the president of the local board of health of the complaint made and requested his attention to the subject.

In reply to the secretary's letter, August 25, the president wrote:

"Yours of August 16th received and in reply would say in regard to the sanitary condition of the village of Pickford, that I have lived in the village for twelve years and I never knew of it in any better condition than it is at the present time. Everything is kept in as good shape as it can very well be in a place of this kind. There is not a case of sickness in the village, nor is there anything in the condition of the village to cause sickness."

Cheese Factory in Samaria, an Alleged Nuisance.

September 10, 1897, complaint reached this office that a cheese factory in Samaria, Bedford Township, Monroe County, was in an unsanitary condition, emitting offensive odors.

The secretary informed the president of the local board of health of the complaint made and requested his attention to the alleged nuisance.

Stagnant Water in Cassopolis Village, an Alleged Nuisance.

March 23, 1897, a resident of Cassopolis Village, Cass County, wrote to this Board stating that a nuisance dangerous to the public health existed in front of his dwelling, "in shape of stagnant water," which the local board neglected to abate. Complainant wished to be instructed as to the proper legal procedure necessary to the abatement of the nuisance.

March 24, replying to complainant's letter, the secretary wrote:

"Your letter of March 23, relative to an alleged nuisance at your residence, is before me. If the board of health will not act, your only recourse would be to go to court. You might make complaint to prosecuting attorney, or you might commence suit for

damages. I would suggest that you consult either the prosecuting attorney or some other good attorney who can give you legal advice."

Swamp in Byron Centre, an Alleged Nuisance.

April 20, a resident of the unincorporated village of Byron Centre, Byron Township, Kent County, complained to this office that there existed in the western portion of the village a swamp which is a nuisance and dangerous to public health; that much filth is run into said swamp; that it is not properly drained, and that in warm weather the odor from the decaying matter is vile and dangerous to the health of the inhabitants residing in the vicinity. The complainant further stated that this alleged nuisance could be abated, by properly draining the swamp, at a cost of not more than \$150.

April 22, the secretary advised the president of the township board of health of the complaint made, and requested that this alleged nuisance be investigated and proper attention be given to it before warm weather began.

Stagnant Water in Blissfield Village, an Alleged Nuisance.

May 19, 1897, Messrs. Kennedy & Keeler of Blissfield Village, Lenawee County, wrote to this Board as follows:

"Our building here in Blissfield stands over a natural drain, which has been filled up by stock pasturing on the flats through which this drain runs. The water has been standing under and around said buildings since the heavy rains in March, and the warm weather now makes it most unbearable.

"We have notified the health officer and also the council, and they have taken no action on the matter. * * * *

"We can't keep our place open if the water is allowed to stand here much longer."

May 20, by letter, the secretary informed the president of the local board of health of the complaint made and requested the attention of the local board to the subject.

May 27, R. M. Eccles, M. D., health officer of Blissfield Village, wrote to the secretary as follows relative to this nuisance:

"The nuisance at Kennedy & Keeler's store is being cared for and the drain will be put in at once."

Mill Pond near Galien Village, an Alleged Nuisance.

May 22, 1897, a resident of Galien Village, Berrien County, complained to the secretary of this Board that a mill pond "covering a large tract of low or bottom land along a small stream known as Galien River, and which on account of the water being stagnant and decaying vegetation therein, causes malarial diseases." Complainant further stated that said pond was covered with a thick green scum, was within one hundred feet of his residence, was a source of sickness to him, that he and others had vainly petitioned the town board for the abatement of the nuisance, and that the health officer had failed to take action towards its removal.

May 28, the secretary, by letter, informed the complainant that the health officer has no specific duty to perform relative to any nuisance. Nuisances should be examined into and abated by the local board of health.

Stagnant Water in Scottville, an Alleged Nuisance.

June 11, 1897, a resident of Scottville Village, Mason County, wrote to the secretary of this Board as follows:

"There is a water-hole in front of my place of business on the main street of this village caused by excavating for water works, and no outlet, and every time it rains said hole fills with water and stays until the sun dries it up. How can I compel the local council to remedy it? I have complained to the local health officer and he says he is powerless, for the council will not do as he orders."

June 15, replying to the above letter, the secretary wrote:

"Your letter of June 11, relative to standing water in a hole in front of your place of business, this would probably come under the head of nuisance. The subject of nuisances comes within the jurisdiction of the local board of health, and not the State Board of Health."

Stagnant Water in Ithaca Village, an Alleged Nuisance.

Complaint was made to the secretary of this Board from Ithaca Village that drainage water in the lower part of the village was a nuisance, and advice was asked how the parties interested could obtain abatement of said nuisance.

In reply the secretary sent the complainant copies of Sections 1640 and 7965, Howell's Statutes, and pamphlet publications of this Board bearing on the subject of nuisances, and containing the information asked for.

Dam in Seville Township, an Alleged Nuisance.

August 11, 1897, T. Kirwin, clerk of Seville Township, Gratiot County, wrote to the secretary of this Board as follows:

"In pursuance of protests from citizens of Seville Township, the health officer, Dr. Chas. McLachlin, called the board of health together, and on investigation we found that the drawing off of the water by a certain dam here was a public nuisance and injurious to the public health. We passed resolutions, etc., and I as clerk served a written notice on the owners or occupants of said dam. Said notice was the same as 'Form No. 72, Township Officers' Guide.' Now, then, the parties refuse to obey the order. * * * I ask you now what is there to be done, for this matter should receive the prompt attention of all health officers."

In reply to Mr. Kirwin's letter, August 12, 1897, the secretary wrote as follows:

"Your letter of August 11, relative to a certain dam being declared a public nuisance dangerous to the public health, is before me. This is a subject entirely within the hands of the local board of health, and not the health officer, except as the *adviser* of his local board of health. The health officer has no legal duty except as he may be directed to act for the local board. I would suggest that you place the subject before the circuit judge."

Dam at Littlefield Lake, an Alleged Nuisance.

Several residents of Gilmore Township, Isabella County, and Surrey Township, Clare County, complained to the secretary of this Board, that a dam near the outlet of Littlefield Lake, by causing the water to overflow about 300 acres of adjacent lands, and thereby giving rise to malarial emanations, was a nuisance; and said complainants requested that they be informed what steps should be taken to procure the abatement of said nuisance.

December 7, 1897, the secretary responded to complainants' request as follows:

"Your letter of November 29, is just received. I note what you have to say concerning the alleged nuisance, and the sickness it probably causes. I know nothing of the conditions, but, from your letter, I would judge that the condition you describe is dangerous to the public health and should be abated.

"However, the case is peculiar, and, as this Board has no direct jurisdiction, I do not see how I can aid you. The local board of health has jurisdiction; but, if it neglects or refuses to act *any person or persons* injured thereby, can make complaint.

"It seems to me that a petition signed by 75 or 100 persons injured or annoyed thereby, ought to have weight with the circuit judge. I would suggest that such a petition, with a formal complaint, be placed before the circuit judge."

Dam near Horse Head Lake, an Alleged Nuisance.

A petition dated December 1, 1897, and signed by forty-eight citizens and freeholders of Mecosta County, requesting the removal of a dam from the outlet of Horse Head Lake in said county; said petition setting forth that said dam, by reason of causing the overflow of certain low lands in its vicinity, was detrimental to the public health and a nuisance.

Replying to the above-mentioned document, January 4, 1898, the secretary wrote:

"This is a subject for the local board of health, and if they refuse, application should be made to the circuit judge. The local board of health is the township board, of which the supervisor is president."

Water Race in Buchanan Village, an Alleged Nuisance.

The following letter dated September 6, 1897, addressed to Dr. Belknap, member of this Board, and signed by E. Field, of Buchanan Village, was referred to the secretary of this Board.

"I have been requested * * * * to again request you to come and examine a certain private water race that is around my house. It has caused my family a great deal of sickness. The local officer will not do anything. It seems as though afraid of offense. It is very bad."

September 14, 1897, the secretary wrote to the president of the local board of health of Buchanan village apprising him of the complaint made and asking the attention of the local board to the subject.

In reply to the secretary's letter, September 23, 1897, E. W. Sanders, president of the village, wrote:

"In answer to your letter of the 14 inst. Will say that I have had a special meeting of our council and board of health to consider the so called nuisance complained of by B. Field and Frank Barnes of our village. The facts are in the case of B. Field that the same complaint has been made for years, and former boards have not condemned it and the present board do not feel like condemning it as a nuisance, and have decided to have you come here and help us out of the matter, and we will defray your expenses for same. We would like to have you come here next Monday, the 27th, or as soon as convenient. Please let me know the day you will come and I will have the board, with myself, meet you at the depot."

Owing to recent absence from the office on Board business at Detroit, and death in his family, the secretary was prevented from accepting Mr. Sanders' invitation to visit Buchanan.

PRIVIES, CESSPOOLS, ETC., ALLEGED NUISANCES.

Privies at District Schools in Arlington Township, Alleged Nuisances.

May 8, 1897, Wm. H. Ashley, health officer of Arlington Township, Van Buren County, wrote to the secretary of this Board as follows:

"As I am a new hand at the business, I hope you will pardon short-comings. I have a question to ask, and that is about the water-closets of the school districts of the township. The most of them are in horrid shape, and never have been looked after by any body. Some of them are as near a nuisance as need be. Have I any duty to perform? If so I wish you would say so under your own signature, and oblige a new but willing worker."

In reply to Health Officer Ashley's letter, May 10, the secretary wrote:

"Replying to your letter of May 8, relative to your duty in connection with nuisances, the law gives you no jurisdiction except what the local board of health may direct you to do as the executive officer of the local board of health, which, in townships, is the township board. Your local board has full jurisdiction. Your duty is to act as sanitary adviser to your local board of health. I trust you will advise improving the condition of those privies at schoolhouses."

Water-closet in Imlay City Village, an Alleged Nuisance.

May 22, 1897, a resident of Imlay City Village, Lapeer County, complained to the secretary of this Board that a certain water-closet, the flow from which emptied into a cesspool near his dwelling, was, by reason of offensive odors, a nuisance, of which the local health officials neglected to cause the abatement.

May 24, the secretary advised the president of the local board of health of the alleged nuisance.

May 29, the health officer of the village informed the secretary that the nuisance in question had been abated.

Information Relative to the Abatement of Nuisances Asked For.

July 24, 1897, the health officer of Lexington Village wrote to the secretary of this Board as follows:

"Could you inform me what the health officer's duties regarding the observation of nuisances dangerous to the public health in cities and villages are? Such as require investigation, as decaying substances, privy vaults, etc. Send me full information in regard to laws on this point."

In reply to the health officer's letter, the secretary sent him copies of sections of Howell's Statutes and pamphlet publications of this Board containing the information asked for.

Privy-Vault in St. Joseph City, an Alleged Nuisance.

September 15, 1897, a resident of St. Joseph City wrote to the secretary of this Board complaining that a privy vault on a neighbor's premises, in close proximity to complainant's windows, emitted offensive odors which were a menace to public health, and requested advice and aid of the secretary in causing the removal of said vault.

September 15, the secretary, by letter, informed the complainant that she should make complaint to the mayor of the city.

On the same date (September 15) the secretary wrote to the mayor advising him of the complaint made and asking his attention to the subject.

October 16, the complainant again wrote to the secretary substantially as follows:

"I placed your letter and circulars of information in the hands of our legal adviser, and asked him to see that complaint was made in proper form, which he did. At the meeting of the city council on September 20th, the matter was brought up, and referred to the board of health. This resulted in the following report from the health officer:

"In regard to the complaint of Mrs. Schwendener, about the unsanitary condition of the privy, situated on the premises of Mrs. Lucy Wilkinson, I would say that I have examined the same quite a number of times and find it in good condition and properly disinfected. I submit that although it may be disagreeable to have an outhouse on the line, and in close proximity to Mrs. Schwendener's house, it is not a public nuisance, nor is it dangerous to public health, consequently I decline to sustain the complaint.

"There is no doubt but what it is the plain duty of the common council to pass an ordinance requiring all property owners in the sewer district to drain into the sewer, and that would do away with all complaints of this nature.

"In conclusion, gentlemen, allow me to say there are many outhouses in the sewer district that are in much worse condition than the one at issue, and it certainly would be a great injustice to force, by law or otherwise, the removal of this offending piece of property, notwithstanding the very extremely sensitive olfactories of the complainant."

Privy-Vault in Battle Creek City, an Alleged Nuisance.

October 6, 1897, a resident of Battle Creek reported to the secretary of this Board that a privy-vault on an adjoining lot was situated within eight feet of his kitchen door, and asked if anything could be done to force the owner of said vault to remove it.

October 11, the secretary wrote to the complainant as follows:

"The local board of health have jurisdiction, and can have the nuisance abated, if it is found to be a nuisance. Your city should have an ordinance bearing directly upon the management of privy-closets."

On the same date (October 11), the secretary, by letter, advised the mayor of the city, who is president of the local board of health, of the complaint made, and continuing, wrote:

"If your city has no ordinance on this subject, it should have one that would regulate the use of water-closets and especially privy-vaults.

"I send you a copy of the Lansing ordinance which may be of use to you, although it does not cover the point made in the complaint relative to the privy adjoining the kitchen of J. H. Ashby."

Privies on Middlebranch River.

October 25, 1897, D. Johnson, M. D., health officer of Marion Village, Osceola County, wrote to the secretary of this Board as follows:

"The Middlebranch is a river, branch of Muskegon River, a trout stream thirty or forty feet wide, of three or four miles an hour flow, or faster, through this village, as water is received over a dam of ten feet head. A small ravine enters it on which five outhouses are built. The village desires to use this ravine for drainage purposes. Some of the outhouses are cleaned by spring freshets. There are also three outhouses built over the river. The game warden has ordered these three outhouses removed and forbids the village allowing any sewage to enter the river. We desire to use this ravine. Can we do so legally?"

October 26, 1897, in reply to the health officer's letter, the secretary wrote:

"Relative to the outhouses, etc., on Middlebranch River, the question whether your village can use the stream for disposal of sewage is a legal one, and I would suggest that your board consult the prosecuting attorney, who is probably familiar with the game and fish laws as well as the laws relating to the public health."

Privies in Elbridge Township, an Alleged Nuisance.

December 11, 1897, J. H. Plass, health officer of Elbridge Township, Oceana County, wrote to the secretary of this Board substantially as follows:

"Complaint has been made to me in regard to a stable and privy built fourteen feet from a spring brook from which a man has to use water for his house and

stock. The complainant lives down stream from where the alleged nuisance is situated. Will you please tell me if the law will make the owner of said buildings remove them?"

In reply to the above quoted letter, December 15, 1897, the secretary wrote:

"Your letter of December 11, making complaint relative to a nuisance in your township where there is a stable and privy within fourteen feet of a spring brook, the water supply of a citizen. You should place the subject before your supervisor who is president of the local board of health. The local board of health should act."

Water-closets in West Bay City, an Alleged Nuisance.

December 18, 1897, a resident of West Bay City, reported to the secretary of this Board that in the vicinity of his residence, there were seven water-closets within 100 feet space, that they were all in a very filthy condition and requested that he be informed if there is any way in which the city can be compelled to abate the nuisance.

December 29, the secretary, by letter, informed the mayor of the city, of the complaint made, requested the attention of the local board of health thereto, and that if such a nuisance existed it be abated.

Pomace in Mendon Village, an Alleged Nuisance.

October 7, 1897, a resident of Mendon Village, St. Joseph County, wrote to the secretary of this Board stating a "large pile of pomace was thrown on the bank of the river last fall, the stench from which is almost unbearable," is a nuisance.

October 11, the secretary advised the president of the local board of health of the complaint made.

In reply to the secretary's letter the village health officer informed the secretary that although he did not consider the pomace a menace to the public health, he had caused it to be disinfected and would later have it removed.

Drain Emptying near a Residence, an Alleged Nuisance.

November 21, 1897, J. D. Buskirk, M. D., health officer of Grandville Village, Kent County, wrote to the secretary of this Board as follows:

"A man owning a house that had no drain put one in and made the outlet about twenty feet from the house. I instructed him at the time that it must go farther, a distance of about seventy feet, where the slops had always been carried, but he refused, and I wish to know if I can compel him to extend it and if so through what procedure."

In reply to Dr. Buskirk's letter, November 23, the secretary wrote:

"Relative to the drain that is alleged to be a nuisance, it is a subject for the *local board of health*. Complaint should be made to the local board of health, which in the village, is probably the village council."

Fish Offal, an Alleged Nuisance.

January 27, 1897, L. B. Sandall, M. D., health officer of Au Sable Township, wrote to the secretary of this Board as follows:

"I write to ask some legal advice. There is a man in our township who for some time (years) has used the refuse from the fishing station as a fertilizer on garden and vacant lots in West Au Sable. He intends doing so next year and has hauled many barrels of same to his lots this winter to use next spring. The citizens of that por-

tion of town have sent the board of health a petition to have them removed or buried before they are spread. The odor all during the hot weather is very bad, I am told, and not even plowing them in covers them sufficiently to keep the odor under, and the flies are thicker than bees by the swarm. Can we force him to bury them and can we as the board of health of Au Sable Township pass a rule or regulation, 'That fish refuse shall not be used as a fertilizer within eighty rods of a house or public road,' or something of that kind to keep it out of odor? The citizens are very much in earnest and we want advice and authority before we act. Can we order him to bury them before it comes warm in spring? Of course they do not cause any disturbance now but once on the ground smell all summer."

In reply to Dr. Sandall's letter, January 29, 1897, the secretary wrote:

"Your letter of January 27, relative to a nuisance in your township, caused by refuse from fish being used as a fertilizer, is before me. Your local board of health should take prompt action and frame and publish, under Sections 1636 and 1639, *Howell's Statutes*, such rules and regulations as in their judgment are for the public-health interests. The local board could pass a regulation, 'That fish refuse shall not be used as a fertilizer within eighty rods of a house,' but I doubt the policy of such a rule reading within eighty rods of a 'public road,' especially in a township. It would seem to me that there might be cases where the use of fish refuse would not cause a nuisance. However, the local board of health has almost unlimited power in such cases. My judgment would be that if there is likely to be any question that the board better consult an attorney regarding the legal points; I am not a lawyer."

SEWAGE-CONTAMINATION OF WATER-SUPPLY.

Alleged Contamination of the Waters of St. Clair River.

Relative to the pollution of the waters of the St. Clair River by sewage. May 16, 1897, Dr. Alex. T. Young, health officer of East China Township, St. Clair County, wrote to the secretary of this Board as follows:

"I notice a large and increasing amount of sewage in the waters of the river St. Clair during the past eight months, produced by the discharge of the sewers of Port Huron and St. Clair cities into said river above this point, which if continued must in the course of time pollute the waters of said river to a dangerous extent, and would suggest that such oversight be used by the State Board of Health as would prevent an accumulation of sewage matter in all the rivers of the State to such an extent as would be dangerous to the public health. The waters of St. Clair River are, in their natural condition, the finest in the State, and it seems a violation of every sanitary law to empty the filth of all the cities on its banks into its waters, as they must in time become polluted to such an extent as to affect the public health of the people who use the water from the river for all purposes, as they do in all the towns and cities on its banks, as well as affect the fishing interests, as it is the spawning ground of most of the food fishes of the lakes. Believing that an ounce of prevention is worth a pound of cure I have made the within suggestion, which in my opinion should be carefully looked into, as it is now in its infancy and if it proves dangerous to the public health could be stopped much easier than it could when these cities had grown much larger than they are now, and had expended large sums of money in public sewers and connections from the same to their several dwellings."

In reply to Dr. Young's letter, May 18, the secretary wrote:

"Accept my thanks for your letter of May 16. * * * The subject of the control of the purity of the inland lakes and streams in Michigan, has never been specifically placed by the Legislature in the care of the State Board of Health. Consequently this Board has never entered upon any systematic investigation of the subject. For some years I have been studying the subject as occasion occurred, and, at the last meeting of the State Engineering Society, I was much interested in a paper and discussion relative to an epidemic of typhoid fever in Detroit, following immediately after the contamination of the St. Clair River by the dredging of sewage from Black River at Port Huron, and the emptying of the dredgings in the St. Clair River below Port Huron. The subject of the relation of typhoid fever to the sewage contamination of the St. Clair River and other streams tributary thereto, is being studied by an engineer in Detroit. This office has aided him by placing in his hands tabulations of reports by local health officers, made at this office.

"What you say about action being taken now being important, before still larger expenditures have been made in such cities as Port Huron and St. Clair, seems to me to be very true. But, for this purpose, legislative action is necessary. In Massachusetts the legislature has placed this subject in the hands of the State Board of Health, and has appropriated \$30,000 or \$40,000 per year for the use of the State Board of Health in making those investigations. Some portion of the work done in Massachusetts would be available for the guidance of action in Michigan. But, to a certain extent, the problems relative to each lake and stream are different, and should be studied by themselves.

"If opportunity occurs, I will place your letter before the State Board of Health at its next meeting."

NIGHT-SOIL, SLOPS, ETC., THROWN ON GROUND.

Information Asked for Relative to Night-Soil.

January 10, 1897. J. I. Walling, a resident of Shepherd Village, wrote to the secretary of this Board for information relative to the disposal of the contents of privy-vaults, as follows: "Would it do to spread the same on garden for fertilizer, to be plowed in in the spring? Would there be any danger from any contagious diseases by so using the same inside of the corporation?"

January 18 the secretary replied as follows to Mr. Walling's letter:

"Replying to your letter of January 16, my personal view would be that night-soil (contents of privy) should *not* be used for fertilizer for gardens to promote the growth of vegetables such as cabbages, radishes, lettuce, celery, etc. Most garden vegetables are eaten raw, that is without cooking. I should think the practice might be very dangerous, and be the means of unnecessary sickness. The dust from night-soil would be one of the sources of danger.

"It is believed that the germs of consumption can remain in the ground in an active condition for considerable time, and it is quite probable that the typhoid fever germ may be harmful some time after it has been placed in or on the soil.

"Such a practice might be dealt with as a nuisance. I send you by mail a number of publications of this office bearing upon the subject of nuisances. In the pamphlet No. 120 I have marked parts of law relating to nuisances. The local board of health could frame and publish in accordance with Sections 1636 and 1639, Howell's Statutes, rules and regulations which would regulate the sale of such vegetables, and such disposition of excreta as is mentioned in your letter."

Night-Soil Dumped in Ann Arbor Township, an Alleged Nuisance.

In December, 1897, residents of Ann Arbor Township complained to the secretary of this Board that night-soil was being drawn from the city of Ann Arbor and dumped on the ground in Ann Arbor Township, a few rods from the city limits and quite near to residences. Sickness from malarial fevers, etc., was attributed to emanations from said night-soil, and the complainants requested the abatement of the nuisance.

The secretary advised the supervisor of the township of the complaint made and asked his attention to the subject.

December 20, Chas. Braunn, supervisor and president of the local board of health of the township wrote to the secretary relative to this alleged nuisance—"I will try and find where it is, and do all I can to remove any nuisance, if there be a nuisance."

Slops Thrown on the Ground, an Alleged Nuisance.

March 31, 1897, a resident of Eaton Rapids wrote to the secretary of this Board stating that slops thrown on the ground near to his bedroom window, by persons occupying apartments on the floor above that in which he lives, created offensive smells which were a nuisance; and asked advice as to the procedure necessary to effect the abatement of said nuisance. The advice asked for was given.

Manure Pile in Manton Village, an Alleged Nuisance.

July 20, 1897, a resident of Manton Village, Wexford County, complained to the secretary of this Board that a manure pile on a neighbor's lot adjoining her premises, was a nuisance.

The secretary, by letter, called the attention of the president of the local board of health to the subject.

July 23, in reply to the secretary's letter, the president wrote stating that arrangements had been made to abate the nuisance.

Tannery Refuse, an Alleged Nuisance.

August 16, 1897, George A. Trueman, M. D., health officer of Munising Village, Alger County, wrote to the secretary of this Board as follows:

"Our town is situated on the shore of a pleasant bay and there is a tannery here. We are on Lake Superior. The tannery people are dumping hair and other refuse into the lake and as health officer I am appealed to. Is it legal? If not what steps must I take?"

In reply to Dr. Trueman's letter, his attention was called from this office, to sections of Howell's Statutes which contain the information asked for, and copies of which were sent to him.

Drippings from Chemical Works, an Alleged Nuisance.

April 20, 1897, a resident of Mancelona Village, Antrim County, wrote to the secretary of this Board as follows relative to this alleged nuisance:

"Permit me to call your attention to the condition of our water supply on my place once more, and beg of you to use the influence of your office in having the nuisance abated. I have just received report from Professor F. S. Kedzie, of the Agricultural College, of another batch of samples of water, taken from the different wells and lakes in this vicinity, by three disinterested parties. The local board of health admits it is a nuisance, but fearing expense to the town they are afraid to serve injunction or do anything for it. Mr. Kedzie says in his report that the water shows decided contamination by the drippings from the Antrim Chemical Company's Works, and that it is utterly unfit for use both for man and stock."

In reply to the above letter, April 23, 1897, the secretary wrote:

"I am sorry to say that I do not see how I can aid you more than I already have. I marked two paragraphs below which you should take special notice of. I do not know that you have placed the subject before the circuit judge. If you have not done so, that seems to me to be your remedy. You do not need to wait for the local board of health, 'any person injured or annoyed thereby' can commence proceedings."

The two marked paragraphs referred to in the secretary's letter were as follows:

"If the circuit court is not in session, application should be made to the circuit judge.

"If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person *injured or annoyed thereby may make complaint and* prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same."

Filthy Person, an Alleged Nuisance.

May 20, 1897, Dr. E. L. Godfrey, health officer of Colon Township, St. Joseph County, wrote to the secretary of this Board as follows:

"We have in our village a man living by himself in a small house—extremely filthy—overrun with vermin. Neighbors complain of stench and filthy habits. One year ago we cleaned him up as thoroughly as possible, buried large amount of rubbish. Cannot keep him fit to live near any one. I have thought it would be advisable to commence proceedings against the owner of the property he occupies. Can we compel him (landlord) to at least remove his habitation to a safe distance from other dwellings? The owner of property is a cousin of the subject complained of, and is wealthy. It is our desire to do what is right and effectual. We cannot keep him clean. He has been at our county house for a short time but swears he will not stay there. The question is, how dispose of him legally and effectually?"

May 21, the secretary replied as follows to Dr. Godfrey's letter:

"Relative to the filthy inhabitant of Colon, if you have good reason to believe that the man has a disease dangerous to the public health you could, in accordance with act 137, laws of 1893, investigate, etc. But if just a case of filth I should think your local board of health could investigate, and if a nuisance is found, order it abated. I presume that such an order would be served on the owner of the property."

Flooded Cellar, an Alleged Nuisance.

October 26, 1897, G. O. Austin, M. D., health officer of Morrice Village, Shiawassee County, reported to this office that in the preceding spring, a certain cellar in the business part of the village was flooded, and that water to the depth of eighteen inches had remained there ever since, without means of draining it off. Dr. Austin further stated in his letter, that the owner of the property had promised to abate the nuisance but had failed to do so, and asked—"Will you have the kindness to direct how the authorities should proceed to have this cellar drained and renovated?"

October 27, 1897, the secretary wrote to Dr. Austin sending him copies of sections of laws and pamphlet publications of this Board which contained the information asked for.

A Pile of Filth, an Alleged Nuisance.

The following item, which appeared in the Laingsburg News of November 4, 1897, having come to the knowledge of the secretary of this Board he called the attention of the president of the board of health of the village to the subject.

"It is quite possible that the laws of health are not as strictly enforced in this village as they should be to prevent outbreaks of contagious diseases. In the most central location in town there is a pile of filth which has been allowed to accumulate for a long time and no one seems to enforce its removal. It is all right to display contagious disease cards, but infinitely better to prevent, as far as possible, the necessity of having to so do."

In reply to the secretary's letter, November 6, 1897, the president of the village wrote:

"The complaint made to you in regard to the filth which has been allowed to accumulate in our village has been attended to and the parties have been notified to remove same, forthwith, and the same will be attended to at once. The health board here had not been notified and knew nothing about the matter."

INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO
HAVE BEEN CAUSED BY THE USE OF KEROSENE,
IN MICHIGAN, DURING THE YEAR END-
ING DECEMBER 31, 1897.

Continuing a practice pursued in previous years, the office of the Secretary of the State Board of Health has, during the year 1897, sought to obtain information relative to each casualty alleged to have been caused by the use of kerosene, which came to the notice of said office.

The principal sources from which this office obtains facts in regard to such casualties as above mentioned, are four, viz.: From reports by the fire marshal of Detroit, State inspectors and deputy inspectors of illuminating oils, local health officers, and from newspaper reports. Relative to the last of these sources of information, it should be stated that the secretary of this Board does not accept as necessarily authentic, newspaper reports of casualties from the use of kerosene. When such reports come to his knowledge, he applies to the proper officials of the localities in which they are said to have occurred for confirmation or contradiction of the reports, and for any information which these officials may be able to give in connection with the alleged casualties. A copy of the form of letter used on such occasions is given in the annual report of this Board for the year 1892, page 334. The data collected from these sources show that during the year 1897, information was received at this office of the occurrence of sixty-two casualties consequent on the use of kerosene in Michigan. These casualties were reported to have occurred in twenty localities, causing loss of five lives, injury (non-fatal) to one person, and damage of property to the amount of \$13,878.

TABLE 1.—*Casualties in Michigan during the year 1897, believed to have been consequent on the use of kerosene, information of which was received at the office of the Secretary of the State Board of Health. In this year the legal test was a flash test of 120° Fah., in a Foster automatic tester.**

	Number of casualties.	Number of localities.	Pecuniary losses. dollars.	Lives lost.	Persons injured (not fatally).
In Detroit.....	43	1	11,678	2	0
In State (outside Detroit).....	19	19	2,200	3	1
Totals.....	62	20	13,878	5	1

*In 1893, the legal test of kerosene, for illuminating purposes, was, by legislative enactment (Section 2, Act 94, Public Acts of 1893) made as follows: "It shall be the duty of the inspector and his deputies to provide themselves at their own expense with the necessary instruments and apparatus for testing the quality of said illuminating oils, and when called upon for that purpose to promptly inspect all oils hereinbefore mentioned, and to reject for illuminating purposes all oils which will emit a combustible vapor at a temperature of 120 degrees of Fahrenheit's thermometer: *Provided*, The quantity of oil used in the flash test shall not be less than half pint. The oil tester adopted shall be the Foster automatic tester cup, with the lighted wick placed inside the tube, and under the thimble which shall be used by the inspector and his deputies." Act 94 became operative July 1, 1893.

This reported damage does not include all the actual pecuniary loss occasioned by the above-mentioned casualties, because in some instances where houses, barns and other property were destroyed the loss was not reported.

Casualties from the Use of Kerosene in 1897, Compared with Previous Years.

TABLE 2.—*Exhibiting the number of casualties believed to have been consequent on the use of kerosene in Michigan (including the city of Detroit), information of which was received at the office of the Secretary of the State Board of Health in each of the eight years, 1889–1897. The legal test of kerosene in each year is explained in the * foot-note to this table.*

Year.	Number of casualties.	Amount of damage done, dollars.	Number of lives lost.	Number of casualties caused by lamp explosions.	Number of casualties caused by stove explosions.
1889	53	†74,049	8	16	2
1890	55	18,282	2	22	6
First six months of 1891	‡30	10,778	2	19	2
Last six months of 1891	‡118	42,050	9	74	6
Total for the year 1891	148	52,828	11	93	8
1892	134	66,106	7	75	17
First six months of 1893	43	25,958	0	21	10
Last six months of 1893	40	23,542	2	22	5
Total for the year 1893	83	49,500	2	43	15
1894	64	20,374	9	29	1
1895	44	28,121	1	18	0
1896	59	17,756	3	33	1
1897	62	13,878	5	31	0

*In the years 1889, 1890, and the first half of 1891, the legal test was a Flash test at 120 degrees Fah., in a closed tester; and in the last half of 1891, in 1892 and the first half of 1893, it was a Burning test at 120 degrees Fah., in an open tester, which, because it varies greatly, is equal to a flash test of from 95 to 110 degrees Fah., probably averages about equal to a flash test of 100 degrees Fah., in a closed tester, like the one approved by the State Board of Health. The last half of 1893, and in 1894, 1895 and 1896 the legal test was a flash test at 120° Fah., in the Foster automatic tester, which has not been approved by the State Board of Health.

†The total reported damage (\$74,049) for 1889 includes \$40,000 damage caused by a single fire at 678 Jefferson avenue, Detroit. The fire was caused by careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

‡Included in these numbers are data relative to 27 reported casualties in 1891, of which the exact dates of occurrence were not reported. In order to make an equitable distribution of these between the first and last halves of the year a proportionate division of them is made, based on the data contained in Table 2 of this article, thus: Table 2 shows that *exclusive* of the above-mentioned 27 casualties, there were reported 121 casualties in the State, in 1891; that 24 (about 20 per cent) of these, occurred in the first half of the year, and 97 (about 80 per cent) occurred in the last half of the year. The 27 casualties, the dates of which are not given, are divided between the first and last halves of the year in the same proportion, that is, 20 per cent of them are added to the first half, and 80 per cent to the last half of the year.

The foregoing tables (2 and 3), based, for 1897, on the data from which Table 1 in this article is constructed and for 1889, 1890, 1891, 1892, 1893, 1894, and 1895 on similar data for those years, are designed to facilitate

comparison of the number of casualties and the resultant damages, which occurred in the State from the use of kerosene during those years.

TABLE 3.—*Exhibiting the number of casualties believed to have been consequent on the use of kerosene in Detroit during each of the years 1889–1897. (Reported by the fire marshal of Detroit to the office of the State Board of Health.) The legal test of kerosene in each year is explained in the * foot-note to Table 2 of this article.*

Year.	Number of casualties.	Amount of damage done, dollars.	Number of lives lost.	Number of casualties caused by lamp explosions.	Number of casualties caused by stove explosions.
1889	35	\$65,250	3	14	2
1890	44	18,282	0	15	6
First six months of 1891	14	2,878	0	9	2
Last six months of 1891	41	9,760	2	26	5
Total for year 1891	55	12,638	2	35	7
1892	79	39,306	2	37	13
First six months of 1893	37	20,958	0	19	10
Last six months of 1893	34	18,536	0	19	5
Total for year 1893	71	39,494	0	38	15
1894	55	18,844	3	28	1
1895	42	27,471	0	17	0
1896	47	17,266	0	26	0
1897	43	11,678	2	20	0

*The total reported damage for 1889 includes \$40,000 damage caused by a single fire at 678 Jefferson avenue. The fire was caused by careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

Table two shows that in the *State, including* the city of Detroit, there were reported to have occurred 62 casualties, resulting in pecuniary losses amounting to \$13,878.00, and the loss of life of five persons. Thirty-one (50 per cent) of these casualties were attributed to lamp explosions. The remaining 31 casualties were attributed to other causes as follows: Lamps upset, 5; fallen lamps, 4; stoves upset, 1; stoves collapsed, 4; other careless use of kerosene, 17.

In Tables 2 and 3, the years 1891 and 1893 are divided into two parts, one comprising the first six months and the other the last six months of those years. The reason for this division is, that the laws regulating the legal test of kerosene in the State were, by legislative enactment, changed during those years, the new laws becoming operative on July first of each of those years. This arrangement of Tables 2 and 3, therefore, gives opportunity not only for comparison of the prevalence of casualties in 1891 and 1893 with the other years; but also of the comparative prevalence of casualties in the first and last halves of 1891 and 1893, under the provisions of the old and new test laws.

PERSONAL INJURIES CONSEQUENT ON THE USE OF KEROSENE.

The following details taken from correspondence of this office, and from newspaper items, which came to the notice of the secretary of this Board, give the circumstances connected with some of the casualties from the use of kerosene, which resulted in a loss of human life and other personal injuries to citizens of this State in 1897:

A Woman Fatally Burned by Kerosene at Port Huron.

February 1, 1897, Mrs. Dennis Sharrow attempted to rekindle fire in her kitchen stove with kerosene. The result was an explosion of the kerosene, during which Mrs. Sharrow was so terribly burned that she died at 3 a. m., February 2, 1897.

A Woman Fatally Burned by Kerosene in Niles City.

Relative to this casualty Fred R. Belknap, M. D., wrote to the secretary of this Board as follows:

"As per request I send sample of kerosene oil used by Mrs. Fox, which either ignited or exploded, and burned her fatally. Personally I do not believe it is any fault of the oil. Mrs. John Fox, a daughter-in-law of the deceased, says that her mother made an anti-mortem statement in which she said she had kindled and lighted a fire, put on the coffee pot and otherwise prepared to get breakfast, but the fire did not seem to her to be burning well, so she opened the stove and poured some oil from a dipper on to the fire. Her children think that the flashing of the oil caused Mrs. Fox to jump back, spill the oil upon her dress and catch fire."

A Woman Fatally Burned by Kerosene in Detroit.

Details relative to this casualty are given by the fire marshal of Detroit, as follows:

"The young lady who was fatally burned at No. 461 Fort street east, on February 18th, died at Harper Hospital, February 23d.

"Her full name was Elsie May Leonard and she was nineteen years of age.

"While in the act of removing a kerosene oil lamp (which she had been using to heat curling irons) from a dresser she accidentally dropped the lamp upon the floor. It was broken by the fall and her clothing was set on fire. She ran out into the street with her clothing ablaze. Passers-by smothered the flames and put out the fire which was very slight."

In addition to the three fatal casualties mentioned above, one life was lost in Newton Township, Calhoun County, in a fire caused by kerosene; and on December 24, 1897, at 625 Michigan avenue, Detroit, Edward Waltenspuger was fatally burned in a fire caused by the explosion of kerosene in a lamp.

The health officer of Fremont Village, Newaygo County, reported one person injured from a kerosene lamp explosion, but did not state the nature of the injuries.

INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO HAVE BEEN CAUSED BY THE USE OF GASOLINE, IN MICHIGAN IN 1897.

In 1897, as in former years, an effort was made at the office of the secretary of the State Board of Health, to collect facts respecting every casualty attributed to the use of gasoline, in Michigan, which came to notice. During the year there were received at the office of the secretary of the Board reports of seventy casualties in sixteen different parts of the State, alleged to have been caused by gasoline, with attendant losses of life and property, and personal injury as follows: Eight persons fatally and eight persons non-fatally injured; damage to property to the amount of \$14,662.00.

The amount of pecuniary loss was not reported in nineteen of the above-mentioned seventy casualties.

TABLE 1.—*Casualties in Michigan during the year 1897, believed to have been consequent on the use of gasoline, information of which was received at the office of the Secretary of the State Board of Health.*

	Number of casualties.	Number of localities.	Pecuniary losses, dollars.	Lives lost.	Persons injured (not fatally).
In Detroit	44	1	13,162	5	1
In State (outside Detroit).....	26	15	1,500	3	7
Totals in Michigan	70	16	14,662	8	8

Of the seventy reported casualties from the use of gasoline during the year 1897, twelve were attributed to stove explosions, twenty-nine to leaking or overflowing stoves, and twenty-nine to carelessness in handling gasoline, and various other causes.

THE SOURCE OF DANGER IN THE USE OF GASOLINE.

The special source of danger in the use of gasoline, is its ready vaporization at low temperatures. When exposed to the air, gasoline evaporates quickly, its vapor mixes with the air, and therewith forms an explosive mixture which readily ignites when it comes in contact with a flame or other sufficient cause. This property of gasoline renders it more dangerous than is gunpowder. Some of the casualties reported were undoubtedly the result of ignorance, or disregard of these facts.

Below are given details relative to some reported casualties. The correctness of the details has been confirmed by health officers or other officials of the localities where the casualties occurred.

Personal Injuries from the use of Gasoline in Jackson City.

February 23, 1897, explosion of a gasoline stove was cause of two persons being severely burned.

May 3, by the explosion of a gasoline stove, one person was fatally and two persons were non-fatally, burned.

A Mother and Child Fatally Burned in Hastings City.

June 29, 1897, by an explosion of gasoline in her kitchen, Mrs. Gilbert Darling and her little daughter were fatally burned.

Two Women Seriously Burned in Lapeer City.

August 2, 1897, Mrs. S. A. Lockwood, and Rena Brown, a domestic, were seriously burned by the explosion of a gasoline stove. Miss Brown, although severely burned herself, saved the life of her mistress by wrapping a rug around her.

Personal Injuries from the use of Gasoline in Detroit.

February 18, at 461 East Fort street, a young lady was fatally burned.

May 1, at 838 Chene street, Lizy Swing aged twenty, and Anthony Swing, aged five, were fatally burned by the careless use of gasoline.

June 21, at 957 McDougall avenue, Mrs. Eliza Lehmann, aged thirty-five, was fatally burned by the explosion of gasoline from an overflowed stove.

July 6, at 907 Willes street east, Mrs. Teresa Tempski, aged fifty-eight, was fatally burned. Her clothes caught fire from a gasoline stove.

August 5, at 95 Illinois street, a woman was severely burned by the ignition of gasoline from a leaking stove.

September 10, at 580 Howard street, a young lady aged seventeen was fatally burned by the explosion of gasoline in a bottle.

September 7, at 27 Fairbanks street, Mrs. Lottie Brierzenski, aged twenty-two, was fatally burned by careless use of gasoline.

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ERRATA.

Page lxiii.—In the second italic head add the words, "proof-reading, printing, etc."

Page 176.—In the † foot-note at the bottom of Table 10, the words "diagram opposite this page," should read "diagram on preceding page."

Page 254.—In column under "per cent of reports stating presence of typhoid fever." third line, read "12" instead of a blank space.

Page 291.—In Table 8, under column (6), read "cases" instead of a blank space.

Page 294.—In the †, ||, and ** foot-notes at the bottom of Table 10, the words "in this instance" should read "in one instance."

Page 310.—The last column of Table 8, second line, should read "8," instead of a blank space.

Page 328.—In Table 11, last line, in column headed "5 to 9 years," read "11.8" instead of "17.8."

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